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Amateur Radio

CQ

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VHF SPECIAL

Results of the First Annual CQ WW VHF WPX Contest

. . . page 11

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THE RADIO AMATEUR'S JOURNAL

KENWOOD

...pacesetter in Amateur radio

All New Compact HF!

"DX-citing!"

TS-440S Compact high performance HF transceiver with general coverage receiver

Kenwood's advanced digital know-how brings Amateurs world-wide "big-rig" performance in a compact package. We call it "Digital DX-citement"—that special feeling you get every time you turn the power on!

- **Covers All Amateur bands**
  General coverage receiver tunes from 100 kHz—30 MHz. Easily modified for HF MARS operation.
- **Direct keyboard entry of frequency**
- **All modes built-in**
  USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.
- **Built-in automatic antenna tuner (optional)**
  Covers 80-10 meters.
- **VS-1 voice synthesizer (optional)**
- **Superior receiver dynamic range**
  Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m)
- **100% duty cycle transmitter**
  Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)

- **Adjustable dial torque**
- **100 memory channels**
  Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
- **TU-8 CTCSS unit (optional)**
  Subtone is memorized when TU-8 is installed.
- **Superb interference reduction**
  IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM.
- **MC-42S UP/DOWN mic. included**
- **Computer interface port**
- **5 IF filter functions**
- **Dual SSB IF filtering**
  A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, **dual** filtering is provided.
- **VOX, full or semi break-in CW; AMTOR compatible.**

Optional accessories:
- AT-440 internal auto. antenna tuner (80 m—10 m)
- AT-250 external auto. tuner (160 m—10 m)
- AT-130 compact mobile antenna tuner (160 m—10 m)
- IF-232C/IC-10 level translator and modem IC kit
- PS-50 heavy duty power supply
- PS-430/PS-30 DC power supply
- SP-430 external speaker
- MB-430 mobile mounting bracket
- YK-88C/88CN 500 Hz/270 Hz CW filters
- YK-88S-88SN 2.4 kHz/1.8 kHz SSB filters
- MC-60A/80/85 desk microphones
- MC-55 (8P) mobile microphone
- HS-4/5/6/7 headphones
- SP-40/50 mobile speakers
- MA-5/VP-1 HF 5 band mobile helical antenna and bumper mount
- TL-922A 2 kw PEP linear amplifier
- SM-220 station monitor
- VS-1 voice synthesizer
- SW-100A/200A/2000 SWR/power meters
- TU-8 CTCSS tone unit
- PG-2C extra DC cable.

Kenwood takes you from HF to OSCAR!

25th Anniversary

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Dependable Duo!

TS-830S HF transceiver.

The "Pacesetter" has become a legend in DX and contest circles.

- Covers all 10 Amateur bands (50 kHz extended coverage).
- Wide receiver dynamic range, Junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VBT). Varies IF filter passband width.
- Notch filter high-Q active circuit in 455-kHz second IF.
- Noise-blanker threshold level control.
- IF shift (passband tuning).
- 6146B final with RF negative feedback. Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands.
- Built-in RF speech processor.
- SSB monitor circuit.
- Built-in digital display, (fluorescent tube), with analog dial.
- Narrow/wide filter selection on CW.
- RIT and XIT (transmitter incremental tuning).

Optional accessories:

- VFO-230 external digital VFO with five memories, digital display.
- VFO-240 external analog VFO.
- AT-230 antenna tuner/SWR/power meter.
- SP-230 external speaker.
- YG-455C (500 Hz) or YG-455CN (250 Hz) CW filter for 455 kHz IF.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter for 8.83 MHz IF.
- KB-1 deluxe heavyweight knob.

TS-530SP HF transceiver.

This "Cents-ational" HF transceiver is recognized worldwide for superior and dependable performance.

- 160-10 meters, LSB, USB, CW, all Amateur frequencies, including new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- Built-in digital display (six digits, fluorescent tubes), with analog dial.
- Narrow/wide filter selector switch for CW and/or SSB.
- Built-in speech processor, for increased talk power.
- IF shift tunes out interfering signals.
- Wide receiver dynamic range, with greater immunity to overload.
- Two 6146B's in final, allows 220 W PEP/180 W DC input on all bands.
- Advanced single-conversion PLL, for better stability, improved spurious characteristics.
- Adjustable noise-blanker, with front panel threshold control.
- RIT/XIT front panel control allows independent fine-tuning of receive or transmit frequencies.

Optional accessories:

- SP-230 external speaker with selectable audio filters.
- VFO-240 remote analog VFO.
- VFO-230 remote digital VFO.
- AT-230 antenna tuner/SWR/power meter.
- MC-50 desk microphone.
- KB-1 deluxe VFO knob.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter.
- YK-88SN (1.8 kHz) narrow SSB filter.

More information on the TS-830S and TS-530SP is available from authorized Kenwood dealers.

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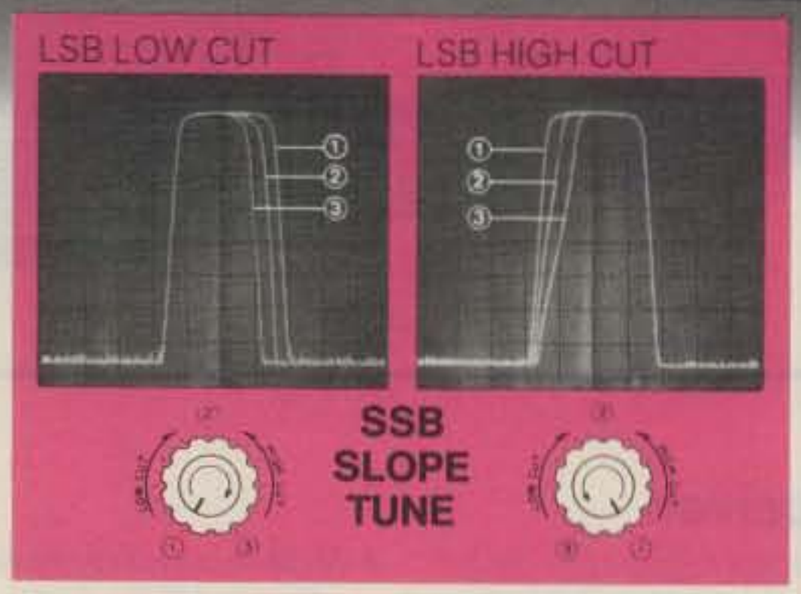
TS-930S

All band HF transceiver/ general coverage receiver.

The TS-930S (with or without automatic antenna tuner) is a high performance DX and contest transceiver delivering superior features and field-proven performance. Compare the TS-930S with other HF rigs in its price class and see why no other rig comes close!

- **160-10 meters, with 150 kHz-30 MHz general coverage receiver.**
  An innovative, quadruple "UP" conversion digital PLL synthesized circuit provides superior frequency accuracy, stability, plus greatly enhanced selectivity.
- **Non-volatile operating system.**
  Kenwood transceivers retain all micro-coded operating functions even when the lithium memory back-up batteries fail.
- **Easily modified for HF MARS and CAP operation.**
- **All solid-state, 28 volt final amplifier for lowest intermodulation distortion.**
- **Power input rated at 250 watts on SSB, CW, FSK, and 80 watts on AM.**
- **Full break-in or semi-break-in CW.**
- **CW VBT and pitch controls.**
  CW Variable Bandwidth Tuning control tunes out interfering signals. The CW pitch control shifts the IF passband and simultaneously changes the beat frequency pitch.



- **SSB slope tuning—Another Kenwood First!**
  Allows independent adjustment of the low and/or high frequency slope of the IF passband, for best interference rejection.
- **IF notch filter.**
- **Tunable audio filter built-in.**
- **RF speech processor.**
- **Dual mode noise blanker.**
- **Dual digital VFOs.**
- **Eight memory channels.**
- **AC power supply built-in.**
- **Built-in automatic antenna tuner (optional).**
  Covers 80-10 m. *Another industry first by Kenwood!*
- **Fluorescent tube digital display.**
- **Excellent receiver dynamic range.**
- **One year limited warranty.**

Optional accessories:

- AT-930 automatic antenna tuner
- SP-930 external speaker, with selectable audio filters
- YG-455C-1 (500 Hz) CW filter
- YG-455CN-1 (250 Hz) CW filter
- YK-88C-1 (500 Hz) CW filter
- YK-88A-1 (6 kHz) AM filter (all plug-in type)
- SO-1 commercial stability TCXO
- MC-60A, MC-80, MC-85 desk microphones
- TL-922A linear amplifier (not for CW QSK)
- SM-220 station monitor
- PC-1A phone patch
- SW-2000, SW-200, SW-100 SWR meters
- HS-4, HS-5, HS-6, and HS-7 headphones.
- LF-30A low-pass filter

More TS-930S information is available from authorized Kenwood dealers

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The Radio Amateur's Journal

JUNE 1986 **VOL. 42, NO. 6**

ON THE COVER: Mike Crisler, N4IFD, adjusts his OSCAR 10 maritime mobile antenna aboard the *Poseidon*. Read about his DXpedition to Nassau in the Bahamas on page 36. Photo by Larry Mulvehill, WB2ZPI.

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Zero Bias

AN EDITORIAL

The way I figure it, about 65,000 people attend hamfests each year. If you back off about a third of that number as those who go to more than one or two, then you have about 40,000 people showing up to support amateur radio. This is about 10% of the licensed amateurs, if all those showing up are licensed. We know that some are there to take exams and some are family, and then there are those who are just curious.

Just what does this statistic mean? Well, I guess it means about the same thing as the other statistic which says that we can account for only about 100 to 150 thousand "active" amateurs. In simplistic terms, we judge amateur radio, or measure it, by what people do, and those who do something define it for everyone else. We say that the ARRL represents amateur radio, when in fact it represents the wishes of about 120,000 members. Perhaps philosophically it may present a defacto representation for the rest, but again in reality we are still talking about 25% of the total number.

Therefore, the big conundrum seems to be what the rest of us are doing, if anything at all. The only movement that can be quantitatively measured is the numbers of amateurs in each license class who do not renew their licenses. Beyond that we infer, generalize, and lump all amateurs together. Obviously, it's easier (and more economical) to treat all amateurs and amateur radio as one happy homogeneous group. On the other hand, it's just as obvious that we do not have either 420,000 active ARRL members or 420,000 subscribers to *CQ* or any other journal.

The great numbers who came into amateur radio during the 50s, after the advent of the Novice license, have grown up. The influx from the CB boom, although not as great as it could have been, has also matured. These statistics —date of birth, sex, geographic distribution— are all drawn from license applications. We can then list by age everyone licensed and pick the physical middle (median) of that list and say what the median age of that group is. In ten years, barring any extreme change, we can extrapolate from the data that there is a very good likelihood that the median age will be 10 years higher. So, if the median age of an amateur today is about 47, in 10 years it will be 57. This still doesn't tell us what the other three-fourths of us are doing with regard to amateur radio, other than hopefully aging gracefully.

Statistically we can state that the median age of an amateur is rising—*ergo*, fewer young people are coming into our ranks. We've been through the reasons, the hypothesized reasons, why youngsters do not become enthralled with amateur radio. Most of the reasons don't stand up basically because they are referenced or biased to our own set of values and experiences at median-age 47.

Most median-age amateurs started working for a living between 1958 and 1962. In 1958 I was working in an electronic parts store (you remember them) and making about $60 per week. You can think back to that period and fill in your own dollar amount. As a point of reference, at that time a fully equipped Ford Fairlane cost in the neighborhood of $2700. I remember taking a Saturday off and traveling by bus and subway downtown in New York to Harrison Radio to have Ben Snyder, W2SOH, sell me a Collins 75A-4, two filters, and a matching speaker for what amounted to 12 weeks of gross pay. I was a ham, and it was something that I needed, had to have, and couldn't live without. Well, for a long time those days and dollars set the tone for what "a lot of money" was. It didn't really matter what I got in return. The dollar amount was predicated on my early experiences as to "how much" it cost. Oh, sure, we built a variety of equipment ourselves, not necessarily out of economic reasons, but simply because there wasn't that much specialized equipment out there to buy. Parts, even surplus parts, were not that cheap even in those days when you consider how many hours of work it took to buy a good meter or a Bud cabinet. It could take two weeks or so of gross pay plus a lot of scrounging to finally come up with the parts for a new transmitter. Then it would take countless hours to build what would be considered very crude and rudimentary by today's standards. On the other hand, was it fun? Sure.

If we can now bring ourselves back to 1986 and think in today's terms of what "a lot of money" is, we can check out the ads for top-of-the-line stand-alone amateur receivers. Also try to forget for a moment that all of the bells and whistles; digital thises and thats; microprocessor controlled, computer enhanced whatevers; plus two zillion memories come as standard features. In today's terms and with today's income I think that you would have to agree that the price is quite a bit lower than 12 weeks of current gross pay for the average median-age amateur. To follow up on this thought, it would also cost less these days to build your own exotically sophisticated transmitter. To be brutally honest about it, though, most of us couldn't. Twenty-five or so years ago the top-of-the-line amateur transceiver sold for about $1500. Today it's somewhere around $2000. It's still true that not everyone can afford to go out and buy one, but it's also true that a far greater number of people these days can (and do).

To most young people, and in fact to those of any age who look at amateur radio for the first time, it is one of many available hobbies. If you are offended by the term *hobby*, so be it. If it makes you happy to think in terms of the *service*, that's okay, too. As a hobby, considering what you get in return for what you invest in terms of time and money, it's got to be about the best deal going. What you get, at any age, is fun. It's fun that can be enjoyed on its own terms and shared with others, limited only by parameters that each of us sets for ourselves.

I'd like to think that the three-fourths of us whom nobody sees are out there having a good time. It would be nice to believe that they are not locked into "the good old days" syndrome and that amateur radio is a worthwhile adjunct to their lives today. It would be pleasant to contemplate their children seeing this positive image and also wanting to become amateurs. Perhaps they see amateur radio as something to be enjoyed on a sometimes basis, not an innate, intense drive towards the sea. Possibly, they could be right. There are more of them than there are of us. Anyway, that's my imaginative explanation of who they are.

Whoever they are, or whoever we are, doesn't really matter in the long run. What matters is that somewhere along the not too distant line there are more of all of us. We are using a great part of a very valuable natural resource, frequency spectrum. Most of us at best simply use it. Some abuse it, and a few make ingenious, innovative use of it. We all hold in common a mystical belief in the inalienable right to continue doing what we do. In terms of 1986, it would profit us more to think rather of having a negotiable lease on a parcel of spectrum that comes up for renewal every so often. It's just something we have the use of right now and not something we collectively own. The people, via the government, have entrusted us with this spectrum, or made it available for our use. Part of continued use is a "profit" on that investment—namely, greater use. Growth within amateur radio is that profit and the return on investment.

Is growth that hard to get? In some ways yes it is. Various groups are experimenting with different approaches to young people. We at *CQ* are working in cooperation with the ARRL to produce illustrated booklets for grade school and junior high school students explaining the world of amateur radio and how they can be part of it. It's one approach and it's a reaching out. On another level we have to encourage those who have made the first move towards us. We have to work towards keeping those already licensed interested enough to renew their licenses. We have to find ways of getting those new Novice licensees on the air and active. Many have their licenses expire without ever getting on the air. Many lose interest and never go on to a higher class of license. A few are bound to do that anyway, but the great majority of them can be saved if we care enough.

Do you care? Do you enjoy amateur radio and have fun at it? Do you mind helping out someone? Can you spare an hour or two every so often? Why don't YOU bring it up at the next club meeting, the "it" being a follow-up group on current members' activity and a follow-up group for newly licensed amateurs. How many of them attend meetings or were invited to join after the class period ended? How many came to one meeting and never came back? Why not use their enthusiasm and have them canvas some of the inactive members? Perhaps they can even help each other. A lot of what is going on and not going on still depends on YOU. What are YOU prepared to give back to amateur radio after all of the years YOU simply took from it? The price of your gear was not an admission price for a free ride.

73, Alan, K2EEK

Say You Saw It In CQ

UNIVERSAL PACKET CONTROLLER model PK-80

$219.95 Suggested Amateur Net Price

The AEA model PK-80 is a wired, tested, and calibrated version of the famous TAPR TNC-2 and comes with a one-year conditional AEA warranty.

You can interface the PK-80 with any ASCII terminal or a personal computer and standard terminal software. The PK-80 is loaded with all the latest AX.25 version 2.0 software and advanced packet hardware circuitry that makes the TNC-2 the newest benchmark for comparision.

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The new AEA Model PM-1 Packet Modem is designed to interface between your existing TNC and your radio. **No internal modifications** to your TNC or radio are necessary. The PM-1 contains independent dual channel filtering with A.M. detection for maximum sensitivity and selectivity under poor H.F. conditions. The PM-1 is optimized for 300 baud operation. A shift frequency of 200 Hz or 600 Hz may be selected from the front panel.

A front panel bar graph tuning indicator is provided to assist the user in precise H.F. tuning of an incoming packet radio signal. There is also a front panel squelch control (variable DCD) provided for sensitivity adjustment under various noise conditions. Just to make your TNC as flexible and useful as possible, we have included two output radio cables. Now you can switch between VHF and HF packet operation by simply pushing this PM-1 front panel switch.

Enjoy Packet Radio to its fullest with the new AEA model PM-1 Packet Modem. Work DX on the low bands and monitor packet mail boxes from the other side of the country. See the PM-1 at your favorite dealer now.

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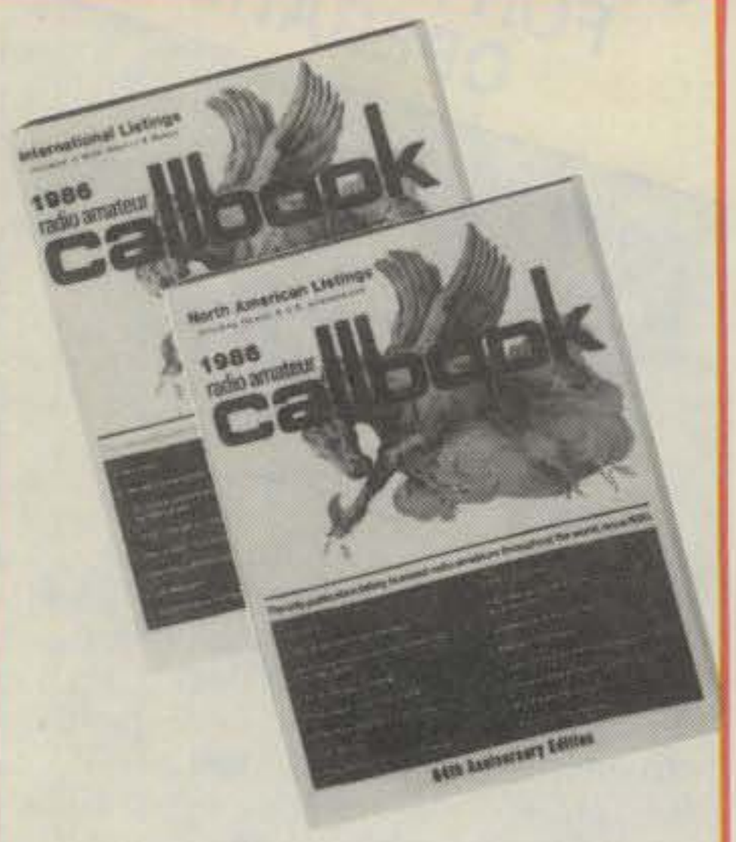

The "Flying Horse" has a great new look!

It's the biggest change in Callbook history! Now there are 3 new Callbooks for 1986.

The North American Callbook lists the amateurs in all countries in North America plus those in Hawaii and the U.S. possessions.

The International Callbook lists the calls, names, and address information for licensed amateurs in all countries outside North America. Coverage includes Europe, Asia, Africa, South America, and the Pacific area (exclusive of Hawaii and the U.S. possessions).

The Callbook Supplement is a whole new idea in Callbook updates. Published June 1, 1986, this Supplement will include all the activity for both the North American and International Callbooks for the preceding 6 months.

Publication date for the 1986 Callbooks is December 1, 1985. See your dealer or order now directly from the publisher.

□ North American Callbook
incl. shipping within USA $25.00
incl. shipping to foreign countries 27.60

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Editor, *CQ:*

I thought I might comment on a letter you ran in the October '85 issue from Jim Stone, KA8VQS of Luzerne, MI.

Jim raised some good points, I think, in response to your Zero Bias editorial re getting more youngsters involved in the hobby. I feel sorry for Jim and others in his situation, but it isn't all that bad. Or at least, it's not any worse than it was when I was a Novice 20 years ago.

The Canadians were allowed phone operation in the Novice subbands then, too; this, combined with broadcast QRM on 40 meters all night long, made operating CW a real challenge. Back in those days, I used an S120 receiver (followed by an S-38E, which was actually better, and then an NC-125, which operated like a dream compared with the single-conversion Hallicrafters units) and a crystal-controlled transmitter running 75 watts DC input (the legal Novice limit back then). It was one hell of a challenge to find a "clear" frequency which happened to fall on one of my crystal channels. Like in the Jean Shepherd, K2ORS, stories of his Novice days in Hammond, Indiana, I would literally fall asleep at the key from calling CQ 50 times in a row. But I did make contacts, perhaps two or three per day, and felt certain that each QSO broke a new DX record.

Some may have been so outraged by all this that they dropped out of amateur radio. After all, we were *federally licensed* to communicate with each other, and it shouldn't be so damned difficult! But I felt the license merely granted me the privilege to transmit a signal; it didn't guarantee any results. The results were up to me.

Now, 20 years later, I am fortunate to have assembled a large, legal-limit (1500 watts output!) station for nine amateur bands. Working the other side of our planet is duck soup; bouncing signals off the moon is no big deal; and hearing stations from distant continents, via amateur satellite, on the 2 meter band is a daily experience. I miss my old Novice days.

I'd recommend that Jim Stone try the "dead" 10 meter band at night for local contacts. When there's no skip, 10 is a great band for local work. He might also try short-range communications on the license-free bands, with low power. You don't even need a license to have a lot of fun experimenting with communications. If his receiver covers the range between the AM broadcast band and the 160 meter amateur band, Jim can eavesdrop on "private" telephone calls made by folks using wirelss units. I've heard "telephone DX" from 50 miles away on 1750 kHz!

Jim might also try erecting a directional, gain antenna for 7 MHz. A simple Vee-beam at 35 feet (above ground) can be made of hookup wire, cost essentially nothing, and offer a few dB gain with high back and side rejection. Aim this *away* from VE-land, and watch a lot of the phone QRM disappear!

There are so many answers. We surely need more young amateurs entering the hobby to assure its sustenance. I don't think new technologies are required to lure potential hams. We must appeal to their thirst for adventure and experimentation! We must promote radio contesting as our equivalent to the Olympics, and appeal to their sense of competition. We need to introduce amateur radio programs to the schools and (commercial) radio stations. How many disk jockeys and radio announcers got their start with ham radio? A lot!

To do "my part," I spend considerable time explaining amateur radio's intrigue and benefits to every single visitor to my shack. To my wife's friends and my business associates, I used to mutter, "Oh, this stuff is just a bunch of radio junk . . . let's go have dinner." Not any more. I'll stay up all night answering their questions, if they're interested enough to ask.

Still, I miss my old Novice days . . .

Steve Katz, WB2WIK
Budd Lake, NJ

Faith Renewed

Editor, *CQ*:

I am a DXer and send out many QSL cards with IRCs to get the QSL. I was surprised to receive with the wanted QSL a return of some of my IRCs sent. The foreign amateur explained that only one was needed in his country. Honestly, truth, and my faith in mankind is renewed. What more can I say, but this act made my day. It is great to see we as amateurs have not lost it.

Joe Hypnarowski, WA6VNR
San Diego, CA

A Net For Young Hams

Editor, *CQ:*

My name is Jon, and another eleven-year-old and myself have been trying to form a net for young hams. It would be greatly appreciated if you would put something in your magazine about this. All information can be sent to me at the address given here. Please ask those interested to list their ages.

Jon, KB6IQW
1537 Centinela #7
Santa Monica, CA 90404

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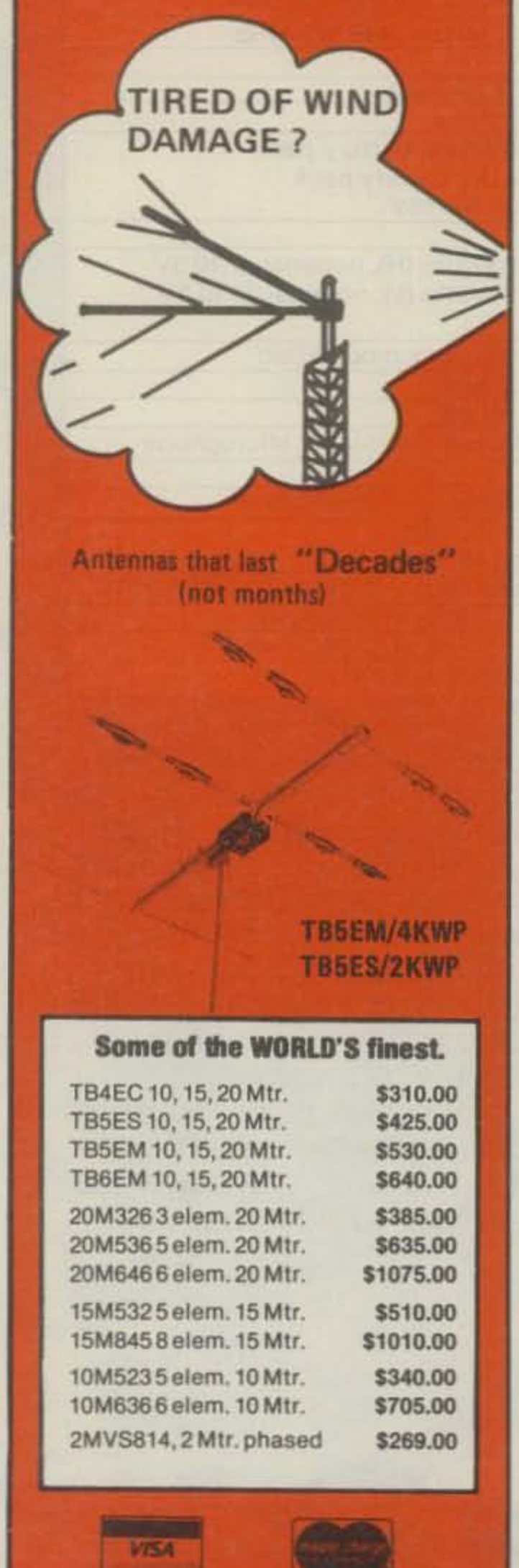

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Announcing

•**Pietersburg, South Africa Special Event** – To commemorate Pietersburg's 100th birthday, the members of the S.A. Radio League, Wolkberg, will issue an award to overseas amateurs who contact four of the following stations: ZS6ALE, ZS6W, ZS6AFD, ZS6AGS, ZS6AAS, ZS6AHD, ZS6AIQ, ZS6BGX, ZS6BYT, ZS6CDO, ZS6EX, ZS6LN, ZS6NQ, ZS6OJ, ZS6PU, ZS6WA, ZS6WE, ZR6KB, ZR6SZ. For more information, contact South African Radio League, Wolkberg Branch, P.O. Box 294, Pietersburg, S.A. 0700.

•**Milestones of Memories** – W0SOE, club station of the Wichita ARC, will operate from Lewis, Kansas on June 6–8 to celebrate their centennial. Operation will be on approximately 7250, 14250, 21325 kHz. QSL via W0SOE, Wichita ARC, 707 N. Main, Wichita, KS 67203.

•**W4POX From Portsmouth, Virginia** – The Portsmouth ARC will operate W4POX from the Lightship Portsmouth on June 6–8 from 1500–0800Z. Frequencies will be around 7230 and 14,290 MHz. For a commemorative QSL send your card and SASE to W4POX, 4800 Manor Ave., Portsmouth, VA 23703. For QSL and certificate, send card and 9″ × 12″ envelope with two first-class stamps.

•**Grand Marais, Manitoba** – The Manitoba DX Group will operate the Catfish DXpedition from Lake Winnepeg on June 6–8. VE4CAT will be on 14.225 phone, 7045 CW, and 7125 CW in Novice band. SASE to P.O. Box 28, Group 322, RR3 Winnipeg, Manitoba R3C 2E7 Canada for QSL and certificate.

•**KO8O Special Event** – The Wireless Institute of Northern Ohio will be on the air as KO8O from Madison, OH to commemorate Ohio Wine Month on June 7th 2300-0300Z on 3860 and 7235 kHz, and June 8 1500–1900Z on 7235 and 14235 kHz. A special 8½″ × 11″ certificate will be available from KO8O – WINO Weekend, 7126 Andover Dr., Mentor, OH 44060 for a legal-size SASE.

•**Fair Lawn, New Jersey** – The Fair Lawn ARC will operate W2NPT for the 25th anniversary of the club on June 7th 1300–2200 UTC and June 8th 1400–1500 UTC. Frequencies: CW—7050, 7110 Novice, 14050, 21050 ± 10 kHz; phone—7285, 14285, 21385 ± 10 kHz. For certificate send QSL and SASE to W2NPT, Frank Leonard, 17-12 Well Dr., Fair Lawn, NJ 07410.

•**Haddonfield, New Jersey** – The South Jersey RA will operate K2AA from 1200Z June 7 until 0400Z June 16 to celebrate its 70th birthday. Frequencies: Phone—3.890, 7.240, 14.280, 21.360, 28.600; CW—3.590, 7.050, 14.050, 21.090, 28.150; 2 meters; Novice bands. For QSL send SASE and QSL or log info to South Jersey Radio Assoc., P.O. Box 1026, Haddonfield, NJ 08033.

•**N9BAT From Brookfield Zoo** – The Chicago Suburban RA will operate N9BAT from the Brookfield Zoo, Brookfield, IL as part of the West Suburban Council BSA Scout-O-Rama on June 14 from 1500–2300Z on 7.250 and 14.250 MHz. A QSL will be available for a QSL and #10 business-size SASE to N9BAT Special Event, P.O. Box 88, Lyons, IL 60534.

•**W9QVE From Argonne, Illinois** – The Argonne ARC will operate W9QVE on June 21 from 11 AM to 4 PM CST to commemorate the 40th anniversary of the U.S. National Laboratory System. Operation will be on 2 meters FM through the club repeater, 144.59/145.19, and on the 20 meter general phone band. Send QSL and SASE to AARC, P.O. Box 275, Argonne, IL 60439.

•**Twin Valley, Minnesota** – KE0DJ will be on the air June 27–30 to commemorate Twin Valley's centennial. The station will be operated as WD0AKO, KE0DJ, and KA0RUS on 15, 20, and 40 phone. Satellite operations will be on June 21–22 on OSCAR 10 mode B. QSL with SASE to KE0DJ, c/o Dale Cary, ARS WD0AKO, 1318 34th Ave. S. #301, Moorhead, MN 56560.

•**Hodgenville, Kentucky** – The Lincoln Trail ARC will operate W4BEJ from Abraham Lincoln Birthplace National Historic Site near Hodgenville, KY during Field Day, June 28–29. For a certificate send QSL (LTARC log will show only Field Day calls—be sure to include that information) and SASE to LTARC, P.O. Box 342, Vine Grove, KY 40175.

•**Vancouver Special Event** – The Vancouver ARC will celebrate its centennial on Field Day June 28–29 by operating World Expo station VE7 EXPO, and station VC7 100. Special QSLs will be issued. Contact VE7CVD, Vancouver ARC, 5861 Willow St., Vancouver, BC V5Z 3S7 Canada.

•**KW4U From Knoxville, Tennessee** – ACB Radio Amateurs, an affiliate of the American Council of the Blind, will operate KW4U from 0000Z June 29 until 2400Z July 5 from Knoxville on 80–10 meters, 30 kHz from bottom of CW bands, 5 kHz from bottom of general phone subbands, ± QRM. For certificate send QSL to John McCann, KW4U, 2105 N. Illinois St., Arlington, VA 22205.

***The following hamfests, etc., are slated for June:**

June 1, **Breezeshooters Hamfest,** White Swan Amusement Park, near Pittsburgh International Airport. Contact William J. Hall, Sr., K3VSL, 3103 Wainbell Ave., Pittsburgh, PA 15216 (412-531-4827).

June 1, **Humbolt ARC Hamfest,** Humbolt, TN. Contact Ed Holmes, W4IGW, 501 N. 18th Ave., Humboldt, TN 38343.

June 1, **Starved Rock Radio Club Hamfest,** Princeton, IL. Contact SRRC, W9MKS, RFD #1, Box 171, Oglesby, IL 61348 (SASE) (815-667-4614).

June 1, **Chelsea Swap 'n Shop,** Chelsea Fairgrounds, Chelsea, MI. Contact William Altenberndt, 3132 Timberline, Jackson, MI 49201 (517-764-5785).

June 7, **North Jersey Microcomputer Show & Flea market,** Secaucus, NJ. Contact Ken Gordon Productions at 800-631-0062, or in NJ 201-297-2526.

June 7, **Central Ontario Flea market,** Guelph, Ontario, Canada. Contact Paul Modray, VE3CHM, 519-579-3057.

June 7, **North Georgia Hamfest,** Lakeview Fort Oglethorpe High School, 4 miles south of Chattanooga, TN. Contact John Ross ARC, P.O. Box 853, Rossville, GA 30741, or call KA4LMG 404-867-7739.

June 7–8, **North Area Repeater Assoc. Amateur Fair,** St. Paul, MN. Contact Amateur Fair, P.O. Box 857, Hopkins, MN 55343 (612-566-4000).

June 7–8, **Ham-O-Rama '86,** Erlanger, KY. Contact NKARC, P.O. Box 1062, Covington, KY 41012, or call WA4WNF at 606-371-2255.

June 7–8, **Northern Colorado Superfest VIII,** Loveland, CO. Contact Cliff Baker, W0ITD, 2623 52nd Ave., Greeley, CO 80634.

June 8, **WARC Hamfest,** Wrightstown, PA. Contact Chuck Dunn, KA3FQQ, 1414 Bradley Lane, Warminster, PA 18974 (215-674-8567).

June 8, **Monroe County Radio Communications Assoc. Hamfest,** Monroe, MI. Contact MCRCA, Box 237, Monroe, MI 48161.

June 8, **Six Meter Club of Chicago Hamfest,** Willow Springs, IL. Contact John Trepina, K9QYT, 5015 W. 31st Place, Cicero, IL 60650.

June 8, **Newington ARL Flea market,** Newington, CT. Contact Les Andrew, KA1KRP, 23 Grove St., West Hartford, CT 06110 (203-523-0453).

June 8, **Delaware County ARA Hamfest,** Drexel Hill, PA. Contact Hamfest, DCARA, P.O. Box 236, Springfield, PA 19064, or call N3DLG at 215-535-1616.

June 8, **Hall of Science ARC Hamfest,** Corona, Queens, NY. Contact John Powers, KA2AHJ at 718-847-8007, or Arnie Schiffman, WB2YXB at 718-343-0172.

June 11–14, **Antique Radio Club of America Convention,** Louisville, KY. Contact ARCA, 81 Steeplechase Rd., Devon, PA 19333 (215-688-2976).

June 14, **Philadelphia Area Microcomputer Show & Flea market,** Willow Grove, PA. Contact Ken Gordon Productions at 800-631-0062, in NJ 201-297-2526.

June 14–15, **Central Washington Hamfest,** Rocky Reach Dam, 7 miles north of Wenatchee, WA. Contact Apple City Radio Club, Merton Hiatt, 1002 N. Surry Rd., Wenatchee, WA 98801.

June 15, **Frederick ARC Hamfest,** Frederick, MD. Contact Jim Kasunic, KA3LPC, 9419 Highlander Ct., Walkersville, MD 21793.

June 15, **Lake County ARC Fathers' Day Hamfest,** Lake County Fairgrounds Industrial Bldg., Crown Point, IN. Contact Bill DeGeer, W9TY, 3601 Tyler St., Gary, IN 46408 (219-887-5413).

June 20–22, **Central Alberta Radio League Picnic,** Red Deer, Canada. Contact VE6BHR, 2 Odstone Green, Red Deer, AB T4N 5J1 Canada (347-5708).

June 21, **Raritan Valley Radio Club Hamfest,** Dunellen, NJ. Contact Dave, KA2TSM, at 201-763-4849.

June 28, **Independent Repeater Assoc. Hamfest,** Byron Center, MI. Contact W8HVG, I.R.A., 562 92nd St. SE, Byron Center, MI 49315 (616-455-3915).

June 29, **YL International SSB Convention,** Seattle, WA. Contact Grace Teitzel, AD7S, P.O. Box 45079, 701 So. 120th, Tacoma, WA 98445.

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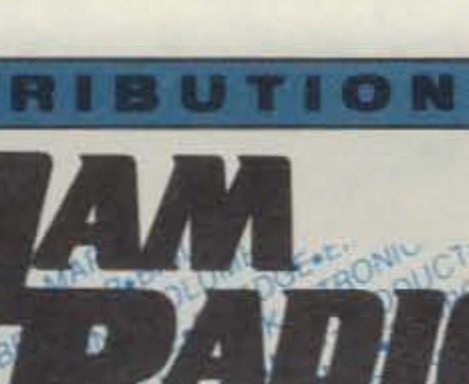

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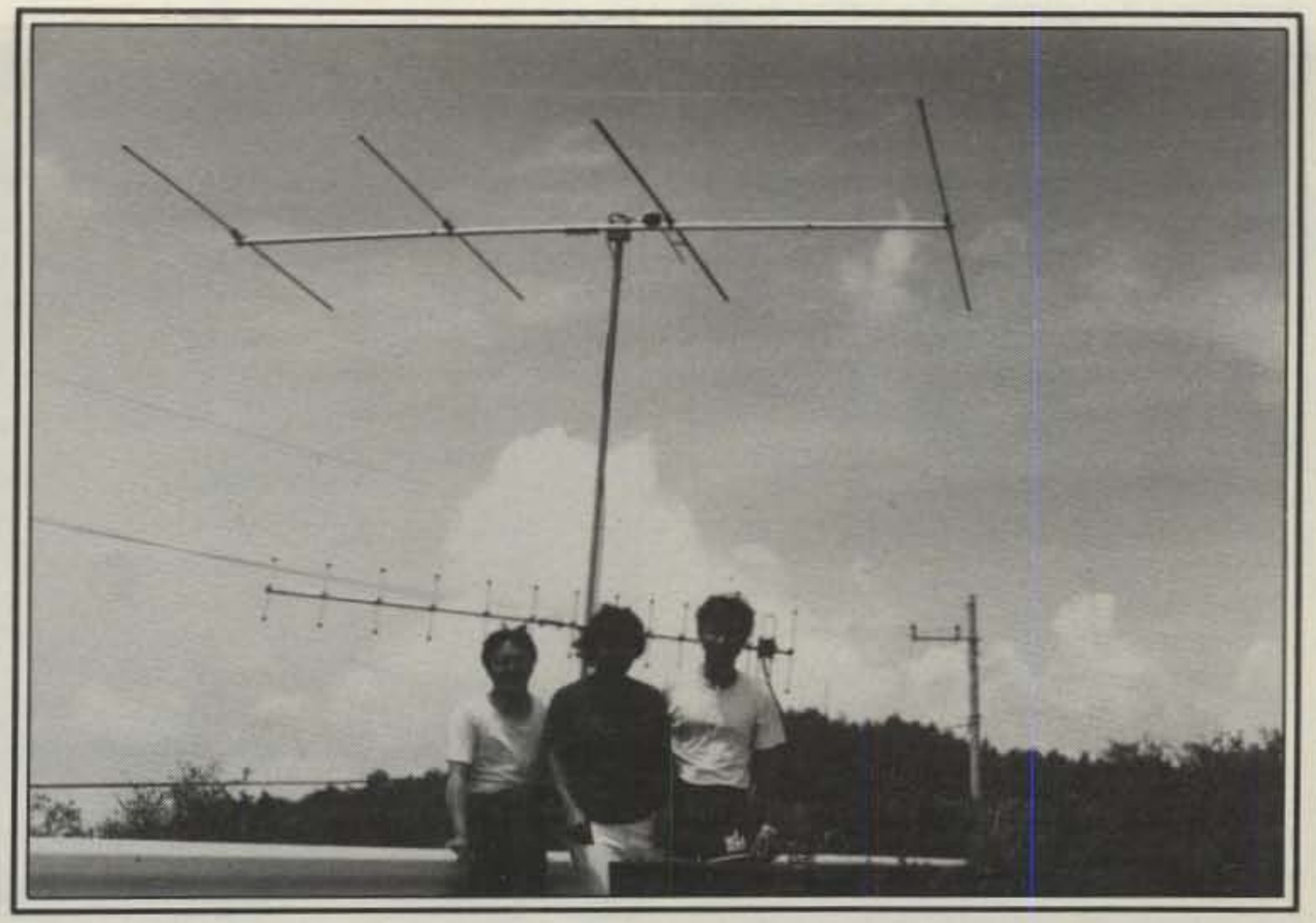
The hearty operators at I4EAT/3 atop 11,000 foot high Mt. Marmolada. Snow in July? You bet! Shown, left to right, are IK4CZF, I4EAT, I4VEQ, and I4YRW.



JF1KOB, JI1BNX, and JO1CRA set up this portable station as JA1ZCX/1 on Mt. Yokone.

The Results of the First Annual CQ World-Wide VHF WPX Contest

BY STEVE KATZ*, WB2WIK

Well, it's over. Actually, it was over on July 21, 1985, and you may wonder why it took so long to print the results. The answer to this question is very complex and would take pages to explain. In a nutshell, we had a lot to learn!

For one thing, logs continued to arrive well into December. This was a couple of months past our official deadline, but we figured this was a new contest which wasn't publicized as well as we would have liked (especially overseas), and many folks weren't aware of the August 31 deadline we had established. Further, many logs were "repackaged" by radio clubs overseas, and there is no way to tell when they were originally mailed by the entrants. In addition, we never expected to receive as many logs as we did for a brand new contest. When asked by *CQ* to offer an estimate of anticipated activity levels, we guessed we'd receive about 250 logs. We received exactly double this quantity—500 logs—by mid-December. Logs are probably still arriving as you read this, but entries this late just can't be counted. Also, we didn't use our best judgment in keeping track of the entries as they arrived. Having learned how *not* to do this, we're much better prepared for the 1986 VHF WPX Contest!

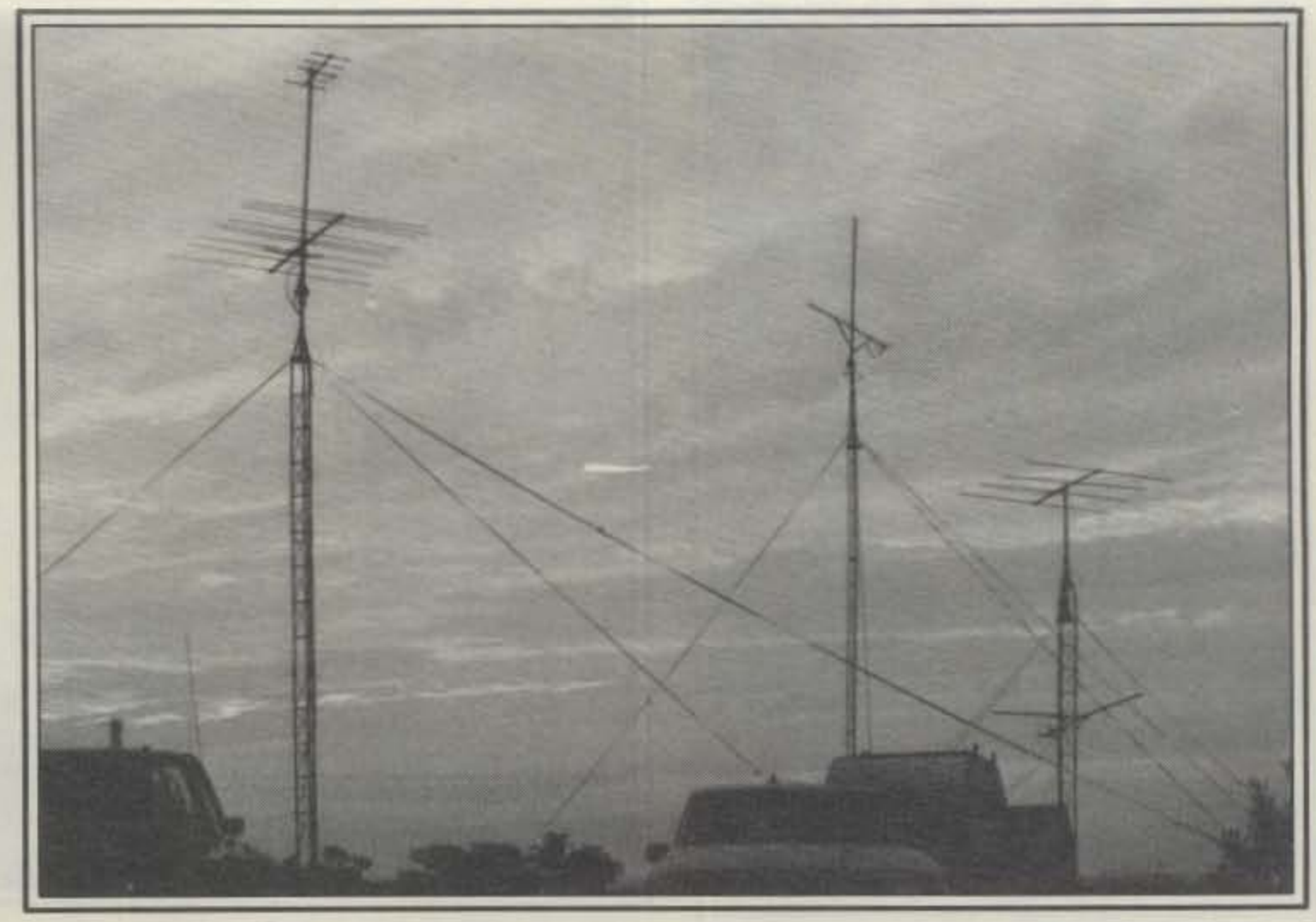
Of course, we had to process photographs, prepare certificates, prod the trophy sponsors to submit their checks in payment for these prized awards, check and recheck all the logs for dupes and proper scoring (we had to rescore about half the entries received), sort the logs more times than would have been necessary if we knew what we were doing, and prepare this report.

I'd like to thank the members of the *CQ* WW VHF WPX Contest Committee for their help in dupe and score checking and the other duties they performed so well. These behind the scenes VHF contest heroes are K1TR, KT2B, NA2O, WA2FXB, WB2OTK/4, K5YY, and N6NB, without whose efforts the administration of this contest would be impossible. Wayne, N6NB, keyed entire logs into his computer to check for dupes—a time-consuming job, considering he got married in the meantime. Congratulations, Wayne!

In all, we received 255 U.S./Canadian, 157 European, and 86 Japanese entries, plus one entry each from CX and ZS. One would expect several close races among all this, and there were a few. The highest and second highest scores in the world came from Europe, with multi-op group F6KAW edging out the group at I4EAT/3 by 30,098 points, or about 14% of F6KAW's score. Both these groups did an amazing job, with I4EAT/3 making 1004 QSO's with 182 prefixes, compared to F6KAW's 1347 QSO's with 158 prefixes. Both these world-class multi-op groups were in multi-op/single-band category, operating only the 144 MHz band! F6GWV, the president of the Radio Club d'Jvry (F6KAW), sent along a highlighted grid-square map of Europe to indicate what kind of DX was worked from their mountaintop QTH in JN38 (near the F/LX border). This group worked 87 grids,

*24 Louis Dr., Budd Lake, NJ 07828

WA4VCC (left) and WB4TLX go at it on 2 meters from their 4,200 foot mountaintop location as KU4V.



The group at NN8H set up 3 towers, and even used helium balloons to hold a 220 MHz quad aloft to take third place national multi-multi honors.

and at their latitude each grid is about the same size as here in the northeastern U.S. Eighty-seven grids on 2 meters! Running 1 kw to two pairs of 16-element F9FT beams, their DX included 15 countries, and many QSO's were made over distances of more than 1000 km.

The I4EAT/3 group didn't do too badly, either, working GJ4ICD via *E*-skip and nearly completing a QSO with a UB5 that got away. These fellows experienced bad weather, including rain and strong winds that destroyed some of their antennas, but persevered to make over 1000 contacts on 2 meters.

Multi-multi group DLØWW used 144 and 432 MHz to complete 465 Q's with 167 PX's and achieved the highest European score in this category. This is one log I'm glad we double-checked. They scored it incorrectly and had listed their score as 52,150 points, when it is actually 90,848! The DLØWW group of 11 operators/loggers set up operations in grid JN49, near the Rhine River, at an elevation of only 110 meters above sea level, proving, I suppose, that height isn't everything, even on VHF. Their 750 watt output to 4 × 16 element F9FT array probably helped a lot.

In the single-multi QRP category I6IQU/6 and F1FJL/p maintained a race to the finish. Using the 2 meter, 70 cm, and 23 cm bands, these two stations worked up nearly identical scores, with I6IQU making 137 QSO's with 68 PX's and F1FJL finishing with 151 Q's and 51 PX's. I6IQU won the race by a mere 561 points.

GJ4ICD showed us all how it is supposed to be done by working an amazing 527 stations and 87 prefixes from his Jersey, U.K. QTH. Braving it out in the single-single class against conditions that Geoff says are "the worst I have had in 7 years of contest operating," his 45,849 point score is ahead of the European pack by a wide margin. I4BXN put in a fine European second-place single-single showing by operating his 2 meter station to complete contacts with 293 stations and 106 prefixes, making a total 31,058 points.

Other efforts worthy of note are those of I4LCK/4, who achieved the highest score in the portable class, 17,484 points, using only the 70 cm band (!), and OK1KEI, who completed 210 QSO's with 21 prefixes using just 145 MHz FM! Congratulations, Armenghi and Petr!

In Japan 6 meters was the band of choice for most of the high-scoring stations. In the single-single QRP class JA6RJK completed 282 QSO's with 66 PX's, edging out JO1BSM and JH7ACC/Ø (244/63 and 269/56, respectively) by a comfortable margin. It is impressive that these operators worked so much with 20 watts PEP. Who says 6 meters is dead?

JE1KUR was also in the 50 MHz race, making 17,955 points (just 657 fewer than JA6RJK) from his portable QTH at Ashigarashimo. Good job, Yuji! Multi-multi group JA1ZCX/1, operating from 1300 meter high Mt. Yakone, made a respectable 233 QSO's with 59 PX's to take top honors in their category. While not winning his category, JA1BWD did a noteworthy job in the single-single QRP class by working 51 stations and 16 PX's on 23 cm only! Takashi ran 20 watts to a 23-element loop antenna and made more QSO's on 1296

The 1985 CQ World-Wide VHF WPX Contest Trophy Winners

Europe			
IW5BML	7,527	S/S QRP	Trophy sponsored by Pete Putman, KT2B
GJ4ICD	45,849	S/S	Trophy sponsored by Microwave Modules
I6IQU/6	11,628	S/M QRP	Trophy sponsored by Dave Penttila, K1COW
HG1S	15,936	S/M	Trophy sponsored by Warren Whelan, WB2ONA
F6KAW	212,826	M/S	Trophy sponsored by the A.R.I.
DLØWW	90,848	M/M	Trophy sponsored by CQ Magazine
OK1KEI	4,410	FM	Trophy sponsored by Steve Katz, WB2WIK
I4LCK/4	17,484	Portable	Trophy sponsored by Don Busick, K5AAD
Japan			
JA6RJK	18,612	S/S QRP	Trophy sponsored by Tom Colyard, N4EJW
JH7VBI/7	6,090	S/S	Trophy sponsored by Mike Crawford, WA2VUN
JI3BFG	6,480	S/M QRP	Trophy sponsored by S.C.O.R.E.
JA3QOS	5,082	S/M	Trophy sponsored by Warren Whelan, WB2ONA
JR2ZIA	1,152	M/S	Trophy sponsored by Pete Putman, KT2B
JA1ZCX/1	16,107	M/M	Trophy sponsored by Phil Anderson, W2HWG
JE1KUR/1	17,955	Portable	Trophy sponsored by Dave Penttila, K1COW
North America			
KB2HZ	4,240	S/S QRP	Trophy sponsored by So. Pickering A.R.C.
K9MRI	16,320	S/S	Trophy sponsored by the Mt. Airy VHF Club
AB1U	5,510	S/M QRP	Trophy sponsored by Microwave Modules
NA1L	100,975	S/M	Trophy sponsored by Warren Whelan, WB2ONA
KU4V	23,496	M/S	Trophy sponsored by The PX Shack
NV6O/2	170,128	M/M	Trophy sponosred by The VHF Shop
KT3M	7,105	FM	Trophy sponsored by Steve Katz, WB2WIK
WØOZL	21,408	Portable	Trophy sponsored by The Rochester VHF Group

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Temp. Range	– 10 deg. C to 60 deg. C.
Dimensions	40H × 140W × 170D mm (Body only)
Weight	1.0Kg (Body only)
Transmitter	
Freq. Range	FM-240 142.000 - 150.00 MHz (FM-740 440.00 - 449.975 MHz)
Output	High = 25 watts, Low = 5 watts (High = low, (Low = 1W) (FM-740 High = Low)
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Tone	Programmable 74-250.3 (34 EIA tones) Encode and Decode
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Int. Freq	1st = 10.7MHz, 2nd = 455KHz (1st-21.4MHz 2nd-455KHz)
Sensitivity	Better than 12dB SINAD @ .2uV
Squelch Sens	Better than .15uV
Bandwidth	+ 6KHz @ – 6dB
Selectivity	+ 12.5KHz @ – 60dB
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Audio Output	More than 2w, 8 ohms load, 10% THD
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MHz than most of us have ever made, especailly in one weekend.

Here in the U.S. the most exciting race was between single-multi stations NA1L and N8FCJ, who were both operating from mountaintops. John, W1XX, who used the NA1L call from his portable perch on Mt. Everett, MA, made 539 Q's and 175 PX's to lead the nation with 100,975 points. Right on John's heels was Dennis, N8FCJ, who set up on a favorite WV mountaintop (Spruce Knob, Dennis? He didn't say.) to make 491 Q's and 187 PX's, resulting in his 97,092 point score. It is interesting to note that Dennis was leading John at 0300 UTC July 21 (the second day of the contest), but John pulled ahead just before his nighttime break at 0346 UTC, and he maintained a small lead from that point on. The 48 QSO lead that won the race for NA1L was contacts made on 146 MHz FM (N8FCJ didn't show any in his log). I understand that John created some excitement when he appeared on 146.52 simplex and began working stations on Long Island, a long distance to his south. Once again, a northeast location proved to be superior for bulk QSO's, while Dennis's WV QTH and excellent setup (kw's on 6 and 2, plus 120 watts on 70 cm) yielded more prefixes and greater DX.

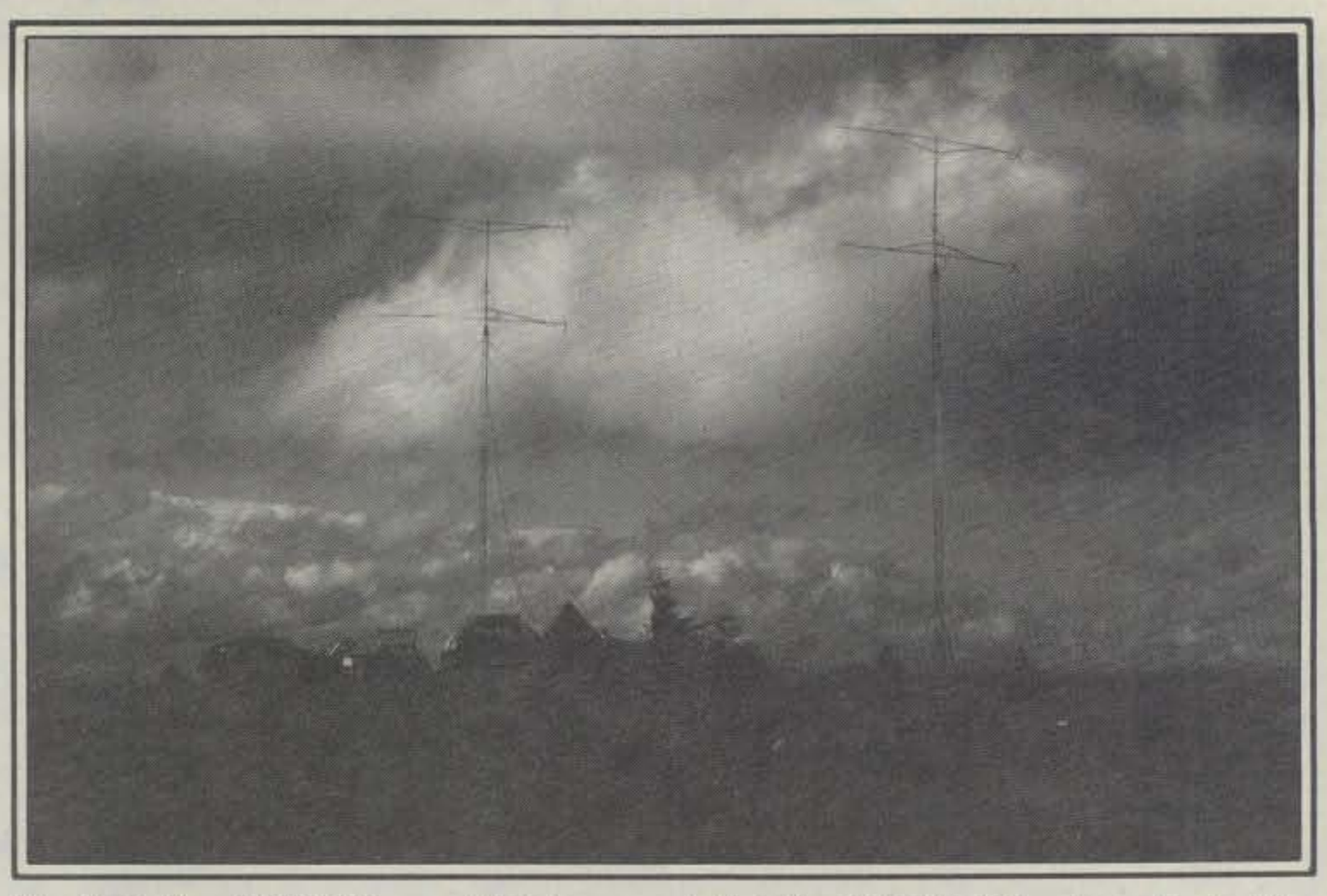
N2BJ in NY made an excellent third-place showing in the national single-multi race, with 438 Q's and 164 PX's netting Barry an 85,444 point score. Despite this fine score, N2BJ complained of "very low activity." What do you want, Barry?

WB2NPE, a usual front-runner in VHF contests, limped through the VHF WPX with a blown-up station, the result of a direct lightning strike a few weeks before the contest weekend. Using "standby" gear Rick got on to make some noise and netted 160 QSO's and 75 PX's for a 13,575 point score. Get that big station back on for the 1986 WPX Contest, Rick, and show us how it's done!

The highest score in North America came from multi-op group NV6O/2, a 7-man club effort by "SCORE." Using five bands from their temporary NJ QTH, these dauntless operators worked 672 stations and 217 prefixes for a total 170,128 point score. I guess this shows that contest activity wasn't as low as some complained about. Actually, there was excellent 144 MHz tropo on Friday evening, followed by a several-hour-long 50 MHz Es session Saturday, allowing NV6O/2 to pile up 257 Q's with 87 PX's on the lower band and 331 Q's with 78 PX's on the higher one. Their 70 cm showing wasn't bad, either: 54 Q's and 32 PX's.

In upstate NY multi-multi station KX2I worked 410 stations and 166 prefixes for a fine second-place national showing. I can attest to their outstanding signal on 6 meters, where this group of 3 operators made 268 QSO's (11 more than NV6O/2).

Elsewhere in the country multi-multi station NN8H employed 11 operators and 4



The field site of F6KAW/p, world high scorer in this first VHF WPX Contest. It looks like these fellows know what contesting is all about.

Some of the NN8H gang (left to right): KA8MXF, N8ABW, NN8H, K8AQM, KA8POW, KA8JJF, KD8SF, and WB8ATA.

bands to net 413 Q's and 137 PX's, an excellent score from MI. Congratulations, Jim and gang!

Other happenings: W0OZL operated portable from 12000 foot Mt. Goliath, CO, where despite snow and high winds Harry made 207 contacts with 96 prefixes for a 21,408 point score, securing second place in this category but taking the trophy. (NA1L was technically the first-place portable entry, but he entered in the more competitive single-multi category.) K7IDX/7 set up portable operations (alone on 50 MHz, with KI7T on 144 MHz) in WA to make a total of 268 Q's and 65 PX's. K9MRI operated single-single on 2 meters to make 240 contacts with 68 prefixes and take national honors in the class. Joe comments, "Last *CQ* VHF contest I entered was in 1959. Thought there was good activity for first VHF WPX Contest. Antenna was severely damaged by wind—half the elements missing and bent in 'vee' shape." Well, this didn't seem to hurt K9MRI's score.

K1TOL in ME just edged out KM8U in MI for the single-single second-place showing. K1TOL operated just 6 meters and worked 159 stations and 67 prefixes; KM8U operated just 2 meters and made 191 Q's and 55 PX's. Results? Lefty surpassed Harlan by just 148 points! Good job, guys. By the way, KM8U says, "I found this contest did produce more QSO points without a band opening than any other VHF contest I've operated."

K1FO, a reknown UHFer and moonbounce enthusiast from CT, made 60 Q's and 29 PX's in a single-band 70 cm effort. Steve recommends we use grid squares as the exchange in the next VHF WPX, and we shall (see 1986 contest rules).

There was significant competition in the single-single QRP category, with 46 logs received. KB2HZ in NJ won this class with 106 Q's and 40 PX's on 2 meters. Using an IC271A and a single Yagi, Derry made good use of just 7 hours of operating time to edge out second-place K5UR (AR), who made 105 Q's/36 PX's, also on 144 MHz. Richard says he didn't realize until after the contest that his sick preamp was generating an S7 noise level! Also in this class of competition was Catharinus, PE1AHX/W4, who had some interesting comments. Catharinus operated from atop Mt. Mitchell, NC—the highest point on the east coast—but didn't hear much activity. I guess he wasn't listening at the right times, because KU4V, multi-single station set up on a 4200 foot mountain (also in NC) made 356 Q's and 66 PX's just on 2 meters, taking national honors in this class of competition.

The single-multi QRP category brought in 19 U.S. entries, with AB1U (CT) taking the wreath with 88 Q's/58 PX's for a total of 5510 points. N0CIH (IA) took second place with 101 Q's/40 PX's and 4800 points.

KT3M, operating just 146 MHz FM, made 203 contacts with 35 prefixes for a world-high FM-only score of 7105 points!

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KD2I putting the 144 MHz SSB station to work at multi-multi first place station NV6O/2. Note the bathing suit. It was a hot weekend!

This must have really taken some effort, Rob. Not bad for an HF contester and 160 meter enthusiast! It's interesting that we received a *lot* of FM-only entries, 40 in total (worldwide), or 8% of the logs received. I'm happy our VHF WPX contest gave some FM operators the chance to experience operating competition firsthand. Perhaps the WPX will give some of these folks the incentive to try the weak-signal modes.

Disappointments: We only received 6 Canadian logs, representing 2% of the North American entries. XJ3KZ achieved the highest Canadian score—76 QSO's and 27 PX's for a total 2052 points. Robert was single-single on 2 meters only, running 12 watts PEP and a 4-element Yagi. Surely there are VE's who can muster a bigger effort! Come on, fellows. I can't believe you were *all* on holidays the third weekend in July!

Another disappointment was receiving only two logs from outside North America, Europe, and Japan. CX8BE and ZS6WB fought against all odds to make some sort of showing, but try as they might, there was apparently no VHF activity in their parts of the world. We've got to encourage more worldwide activity, even in advance of the next solar cycle peak!

73, Steve, WB2WIK

Operator's Comments

We felt it only right to include some comments from the contest entrants, and thought a bit about the best way to do this. We finally settled on presenting their thoughts in no particular order, thus encouraging readers to look through *all* the comments while searching for their own!

This contest was to be the first major effort by our contest group (the Eastern Michigan Contest Club), which had been pulled together largely by Ted, K8AQM, the unspoken cheerleader .... Probably the most significant event during the contest was a contact made on 220 MHz with a station 35 miles away, and later finding the coax and antenna disconnected from the rig .... Generally, we had a lot of fun, burned up 15 gallons of gas, and we are looking forward to next year.—*NN8H*. I was favorably impressed at the level of activity on SSB and CW. The big multi-multis we are used to hearing in the ARRL contests weren't in evidence in these parts. They missed a great contest. The prefix multipliers are great because even the most modest station is in range of many multipliers . . .—*NC9F*. Woke up at 5:30 a.m. Saturday to work 6 meter scatter, only to have it open on Es around 12:30 p.m. and work the same stations!—*WB2OTK/4*. Caught a brief opening, probably via double-hop Es, into California on 6 meters!—*NT4T*. As an avid HF contester, I was looking for a new thrill, and this is it!—*WB4BVY*. It was very exciting to make QSO's from my holidays QTH on the beautiful Isle of Elba . . .—*HB9CWA/IA5/p*. Sorry, but no activity in this part of Europe on 70 cm.—*I4LCK (ed. note: 17484 points on 432 MHz is no activity?)*.

Low activity in West Germany, but nevertheless I worked my first Italian on 144 MHz!—*DL8ZAW*. The first VHF WPX Contest was very nice. Congratulations!—*YO1ATW/p*. I chose to operate single-op QRP, but that was probably a mistake. Next year I'll QRV with a QRO station to "catch" the stations—*F1EWP*. With 15 countries and 1366 QSO's, it's not a bad score for Europe. With a little more publicity, we probably could have had 2000 QSO's.—*F6KAW/p*. Been on the air 22 years. Just recently got on VHF/UHF. It's nice to get excited about working Vermont, Virginia, etc. This WPX is more fun than HF!—*AB1U*. The highlight was working NV6O/2 on 1296 MHz (and 5 bands!), which is out of my normal range on this band from home.—*AF1T*. Next year I'll start building antennas before Friday!—*WA1YXL*. Worked two new states on 2 meters, thanks to N4AR and K9MRI.—*K3ZO*. A great July contest. Please try to make it an annual event.—*W2HRW*.

Oh happy day! I finally had a QSO on 1296 MHz!—*K5IS*. Six meters was great! Had two openings, nearly everyone worked was a multiplier!—*KD5RO*. I never expected I could enter and enjoy this contest so much on the VHF bands!—*JF1FZI*. TNX FB contest on 6 meters and down.—*JHØDYN. (Ed. note: I think I know what he meant.)* I really exerted myself!!—*JP1AVZ*. I knew that operating an HT would be pushing it but decided to participate anyway. I operated from the home QTH and Dodger Stadium . . .—*KB6ISM*. Biggest thrill was working NR6E/7 in Nevada for my state number 10 on 2 meters.—*WA8LLY/6*. Good double hop opening to the east coast . . . worked 5 new states, 6 new grids.—*N7BUP*. Jeeped in to rugged area at 8000 feet just west of Mt. Rose to give out Nevada QSO's and NR7 multiplier. Had to leave early Saturday afternoon as rains would have made the trails out impassible.—*NR6E/7*. Very good contest!—*YO5TP/p*. More stations took part than I expected. So, I really want to be active next year in the VHF WPX.—*JR6JOE/1*.

Sure hope this is a yearly thing.—*K9BQL*. Finally a VHF contest with easy to work multipliers!—*KB9S*. First contest for me, just got into 6 meters, and the band opened!—*KA9DZM*. Sure was tiring hearing only WB2OTK/4 for 2½ hours on Sunday.—*KCØQR*. Worked seven new grids and one new state.—*NØBJN*. Nice contest, lots of interest in our area.—*N9KS*. I've always enjoyed *CQ* tests and the VHF tests of the 1960's where counties were multipliers were still the most fun in my opinion.—*W3ILG*. Two weeks of putting up the tower, the new Boomer, and my FM Boomer gave me no problems, but one inter-

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mittent TS700SP did. Hopefully, you will sponsor the contest again next year and Murphy will let me enjoy it!—*KK3Q.* No FM next time. Did not like the practice of some stations going to repeater frequencies and working members on simplex. Would also eliminate skeds.—*KB2HZ.* Congratulations! I'm very happy to participate in the first VHF WPX contest, but was troubled by thunderstorms . . . —*JH7ACC/Ø.*

Nice new contest. Need more publicity in this part of the world.—*HG5KF.* I operated QRP (2.5 watts output). I observed a lot of Es during the contest. I advertised about this contest in the roll-calls . . . —*JL3AZA. (Ed. note: I guess he means "nets.")* . . . it's difficult to explain this contest to everyone, but I enjoyed it enough!—*JM1CAX.* Disappointing activity levels here in W1 . . .—*W1GXT. (Ed. note: come on, Lew . . . NA1L made the world's highest single-op score.)* First, the preamp went south, then bad QRN all weekend. S5 to S9 noise levels, but still worked a new state (KY).—*KB3OQ.* The level of activity on 6 meters from the northeast corridor was disappointing, but double-hop Es made up for it . . . —*AC3T.* Most QSO's take at least a minute because people want to know your state and grid square.—*KA3B. (Ed. note: 1986 VHF WPX includes a grid square exchange in lieu of the serial numbers; we're learning.)* I thought I'd try QRP. Wrong move!! QRO all the way around next year!—*WA3YON.* Considering the generally poor conditions on 50 MHz, about as much as one could expect. See you next year!—*W4WHK.*

The transmission fell out of my truck the day before the contest, so I couldn't go out with the KU4V gang. I worked the contest from home . . . . They took my Boomer 3219 and all I had left was a Ringo at 95 feet!—*KA4WYC.* It was great participating in a NEW contest. Conditions were fair to poor. Activity not too super in the south, but we had a ball. A fun weekend to be sure . . . —*KU4V.* A very good contest—potentially a great one. In the midwest there was quite a bit of activity. You have a good weekend . . . in a few years, this could be the best VHF contest going. Don't change the weekend, but shorten the time, as 48 hours is too long.—*K9AKS. (Ed. note: We heard this from a few ops.)* I just got my 2 meter all-mode rig one month before the contest and am now looking forward to adding a horizontal antenna. Can't wait until next year's contest!—*N9EOM.* It's very interesting to note that my total prefix number is very close to total number of grids in the ARRL tests . . . —*WB9MSV. (Ed. note: We heard this from many ops, and we predicted this to be the case.)* Enjoyed it. Working 2 meters indoors is tough!—*KV9C.* Worked one new state (DE) on 50 MHz and 4 new states on 144 MHz (CT, AL, SC, NY), none of which has returned a QSL card! Cheap, cheap, cheap!! —*K9BDI.* Nice to meet some friends during the contest . . . maybe go mountaintop next year.—*KC2KK. (Ed. note: That's the spirit!)*

Details of the 1986 VHF WPX Contest were printed in the April issue. We expect this year's contest to be better than last, and we urge everyone who is equipped for VHF operation to participate. You never know. The "bug" might bite and you'll spend all weekend at it! If you *do* participate, *please* send in a log; it makes the winners feel better, and it makes our log-checking more thorough. We're still soliciting trophy sponsors, and we need your support! If the VHF WPX Contest expands to other continents, we'll need more trophies—possibly dozens more. If you'd like to sponsor a trophy, please let us know by writing to S.C.O.R.E., P.O. Box 1161, Denville, NJ 07834 or to *CQ* Magazine. Thanks!

Multi-Op Station Operators

DLØWW: DF8IK, DG6PQ, DG6KD, DL3ZA, DG8FAZ, DHØFAF, DF3UB, DL8EZ, DL/K1LL, DF1ZE, SWL Klaus. **F6KAW/p:** FC1JNI, F6BDO, F6DZS, F6BPX, F6IFR, F6CWN, F6HLC, F6GIF, F6GWV. **HG8KAX:** HA8LKB, HG8LKC. **HGØKDA:** HAØNAE, Kiss Zsolt, Nagy Sandor. **HG5KFV** & Ivan Artner, Istvan Molnar. **HGØKHQ:** HAØHQ, HAØDR. **HGØKLZ:** Devenyi Jozsef, Tomasovszki Pal. **HG1KZH:** HA1XO, HA1ZS. **IW4ADT/4** & I4JED. **I4EAT/3** & IK4CZF, I4YRW, I4VEQ. **OZ7HVI:** OZ1AXG, OZ1ABA, OZ1FTY, OZ1HVW. **JA1ZCX/1:** JO1CRA, JI1BNX, JF1KOB. **JR2ZIA:** JA9SSY , JI2JXR. **JH3YKC:** Nobori Fujita, Hideaki Yokori. **JF3ZAH:** JH3DJA, JI3FQH. **JH7YAA/7:** JJ1MVV, JG3JRM, JF7CWW, JHØMRP. **KX2I** & N2AU, WA2GBG. **NV6O/2** & KT2B, KC2PX, WA2VUN, WB2WIK, AK2F, KD2I. **WV2ZOW** & WB2TIX, WB2DYB, WA2FZW. **N3BAI** & W3AUN, WB3KYX. **KU4V** & K4LVV, WA4VCC, WA4UNZ, WB4TLX, WB4PCS, WD4ABZ, AA4ZZ. **WB4WXE** & Laura Sine. **WB5RUS** & K5LZO, KE5IV, KA5SBS, KD5SP. **N6IGA** & N6ICW. **NN8H** & K8AQM, KA8JJF, KA8MXF, KA8POW, KC8KQ, KD8SF, N8ABW, N8ASB, WB8ATA, WD9INF. **N9EMC** & ??. **WAØTKJ** & WBØDRL.

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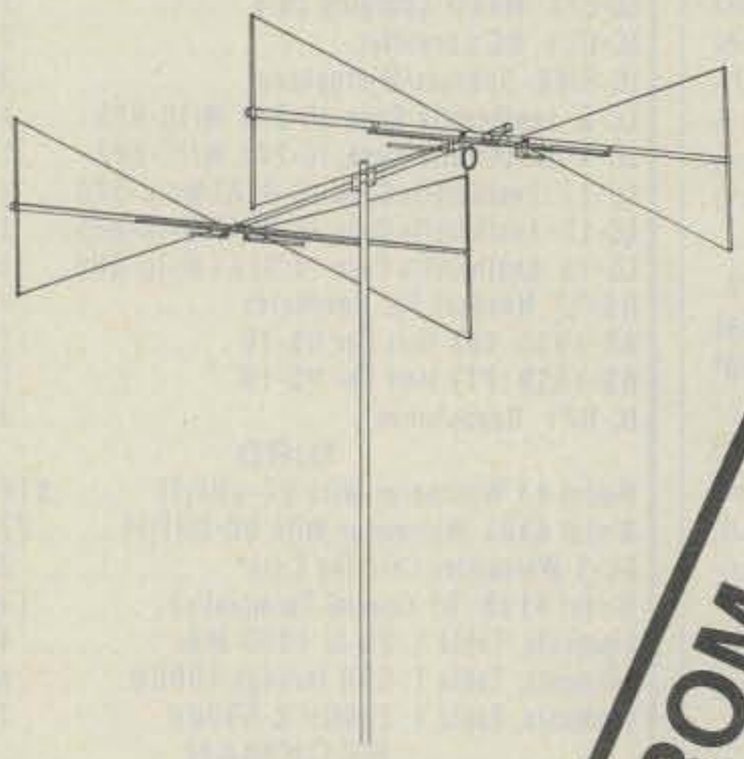

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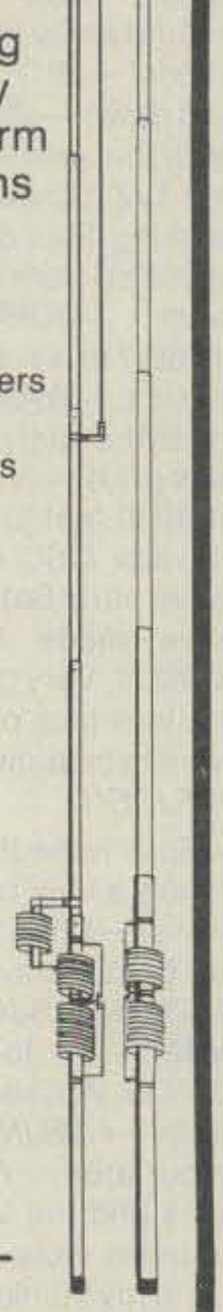

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UNITED STATES

1st District

CT

AA2Z/1	68,730	(4)
AB1U	5,510	(3)
K1FO	3,480	(2) D
W1GRW	500	(4)
K3ZJ	480	(2) B

MA

NA1L	100,975	(4)
K5MA/1	8,640	(2) B
W1GXT	1,392	(4)
KA1DHO	399	(4)
NA1G	375	(1) B
N1DDN	24	(1) B
WA3EEC	16	(1) B

ME

K1TQL	10,653	(2) A
W3HQT	66	(2) B
WA1YXL	28	(1) B
WA1TDA	3	(1) B

NH

AF1T	4,848	(4)
K1TR	1,625	(2) B
KA1CDZ	630	(3)

VT

K1IK	440	(2) A

2nd District

NJ

NV6O/2	170,128	(6)
W2HRW	17,160	(4)
WB2NPE	13,575	(4)
KB2HZ	4,240	(1) B
KA2IVS	3,204	(2) B
WA2ALM	2,560	(2) B
WA2CWA	2,240	(2) A
WV2ZOW	1,180	(5)
WA2GPA	525	(1) B
KR2J	104	(7)
WB2MAE	90	(8)
N2COH	9	(7)

NY

N2BJ	85,444	(4)
KX2I	71,380	(6)
K2GK	12,874	(4)
KE2N	7,250	(2) B
NA2A	1,800	(4)
WB2ELB	1,739	(3)
KA2MRP	432	(4)
KC2KK	204	(2) B
AF2K	96	(8)
N2WK	32	(2) C
KA2PHQ	1	(1) B

3rd District

DE

KB3PD	7,644	(2) B
AC3T	4,914	(2) A
KA3KHZ	3,864	(2) B
KA3B	323	(2) A

MD

K3ZO	15,498	(4)
W3GN	5,244	(4)
KB3HH	2,405	(4)
AA3O	1,092	(1) B
N3BAI	864	(5) B
N3AEB	520	(1) B
K3TW	323	(2) B

PA

KT3M	7,105	(7)
WB3DNA	3,157	(2) B
KA3KZF	1,674	(2) B
WA3YON	1,666	(3)
WB2BJH/3	1,550	(2) B
KM3T	988	(2) B
KB3A	667	(3)
KB3OQ	500	(2) B
KA3GDX	404	(3)
W3KHQ	306	(1) A
W3ILG	272	(2) A
WB3EUM	160	(2) B
AI3Q	154	(1) B
KA3BET	100	(1) B
KT3G	1	(2) A
WB3FUR	1	(2) A

4th District

AL

WB4NJG	13,200	(4)
KA4BLN	667	(3)
WB7ECS/4	304	(3)

FL

N4EJW	11,200	(4)
W5HUQ/4	7,260	(4)
KC3CL/4	2,856	(4)
W4WHK	1,683	(2) A
N4EJV	808	(3)
WD4PQN	420	(4)
WA4OFS	297	(4)
NF4L	48	(2) B
KK3Q	4	(7)

GA

WS4F	11,461	(4)
WB4WXE	483	(6)
WL7ACY/4	324	(1) A
WL7AZB/4	320	(3)
WB4YLR	48	(1) A

KY

N4KCM	8,025	(4)
KC4EG	1,938	(4)

NC

KU4V	23,496	(5)
N2CJP/4	2,345	(4)
KA4UYC	1,440	(1) B
NT4T	858	(2) A
PE1AHX/W4	720	(1) B
KS4S	156	(3)

SC

WB2OTK/4	16,928	(4)
NB4S	468	(2) B
KA4WNX	4	(1) B

TN

AD4F	1,140	(2) A

VA

N4HB	8,165	(4)
WB4BVY	3,230	(2) B
K2UOP/4	2,145	(1) B
N4MM	304	(2) B
W4LMJ	156	(2) B

5th District

AR

K5YY	7,293	(4)
K5UR	3,780	(1) B
KA9LDS/5	3,055	(4)
WB5JAR	1,960	(4)

LA

N5HYV	325	(2) B

NM

KI3L/5	2,881	(2) A
KA5EBL	120	(4)

OK

W5NZS	9,248	(4)
KB5MR	8,253	(4)

TX

WB5RUS	23,040	(6)
KD5RO	11,109	(4)
K5IS	8,349	(4)
WB5KYK	6,960	(4)
KE5EP	5,980	(4)
WA5IYX	1,170	(2) A
K5HGX	400	(4)
WA5DTK	88	(7)
K5PG	4	(1) B
K7CW/5	1	(1) B

6th District

CA

W6RXQ	16,184	(4)
KF6ZB	11,151	(4)
KA6ING	10,890	(4)
N6IGA	10,556	(6)
KG6MW	8,424	(8)
K6CH	3,186	(4)
N6CW	2,925	(2) B
WI6I	920	(1) A
K6PFW	782	(4)
KA6PYA	676	(1) B
WD6BCN	504	(4)
WB6VYH	378	(2) A
WA8LLY/6	300	(4)
KA6VKP	162	(7)
KK6C	102	(1) B
KA6RIK	66	(1) B
K6PHE	30	(2) A
N6LVT	14	(1) B
K6XO	9	(7)
KB6ISM	9	(7)
KD6PY	6	(4)

7th District

AZ

W7US	2,014	(4)
WB7OHF	1,674	(4)
N7BUP	480	(4)
WA7KLK	56	(1) A

ID

KD7IY	437	(4)

NV

NR6E/7	960	(8)
W7ABX	56	(2) A

OR

WA3RMX/7	2,884	(3)
W7ZR	2,160	(3)
W7UDM	1,078	(4)
WB7UNU	442	(3)
AI7B	396	(2) B

UT

WA7TUX	77	(1) A

WA

K7IDX/7	17,240	(8)
KI7T	2,349	(4)
NG7N	370	(4)
W7ZSL	247	(4)
WA7UJR	24	(7)

WY

KT7V	2,294	(2) A

8th District

MI

NN8H	61,513	(6)
KM8U	10,505	(2) B
K8NWD	7,250	(2) B
NE8I	1,242	(4)
K8OOK	16	(1) A

OH

NI8O	5,772	(4)
N8DJB	4,823	(4)
WA8LXJ	1,440	(3)
N8ETQ	660	(1) B
K8UNV	399	(2) A
N8BJN	285	(2) B
WD8IFC	28	(7)

WV

N8FCJ	97,092	(4)

9th District

IN

K9MRI	16,320	(2) B
KA8MRI/9	7,590	(4)
AF9Y	6,600	(2) B
K9BDI	2,067	(4)
KA9DZM	1,591	(4)
AG9S	1,120	(2) A
WA9PKL	700	(4)
KB9C	504	(8)
KY9B	330	(7)
N9AVC	300	(1) B
N9CUE	238	(2) B
KA9MQI	143	(1) B
KV9C	88	(1) B
K8LEN	80	(3)
KA9TVF	40	(7)
WB8DLC	4	(7)

IL

WB9MSV	27,540	(4)
NC9F	23,040	(4)
KA9MGR	12,300	(4)
N9EMC	7,360	(5)
K9AKS	4,200	(2) B
KM9L	2,108	(2) B
WB9JKI	1,643	(1) B
WA9FIH	1,584	(4)
KA9QIK	1,551	(4)
N9EEO	1,404	(2) B
N9CEX	1,276	(2) A
AF9R	588	(1) D
N8AXA/9	588	(1) B
KD9OT	570	(2) B
K9BQL	560	(2) B
N9EEO	285	(1) A
N9EOM	247	(1) B
KR9G	234	(1) D
WB9STR	49	(1) A
WA9AYJ	16	(1) A
WD9AEU	12	(7)

WI

KB9S	4,240	(4)
KY9P	2,961	(2) A
KW9O	1,911	(4)
KA9OBL	902	(2) B
N9KS	544	(2) A
W9YCV	352	(4)

10th District

CO

WØOZL	21,408	(8)
KDØGT	18,744	(4)
WØKEA	4,278	(4)

IA

WBØZKG	22,724	(4)
NØCIH	4,800	(3)
WAØDCB	2,508	(4)

KS

WAØTKJ	43,885	(6)
NØLL	14,450	(4)
KØVUA	703	(2) B
WØRT	135	(4)
KBØU	119	(1) B
WAØPWE	100	(1) A
ABØX	60	(7)
KCØZR	12	(2) B

MN

WBØIHR	3	(7)

MO

KØTLM	13,098	(4)
WØJLC	5,215	(4)
KDØFW	1,914	(3)
WDØFLJ	1,075	(4)
KØCS	624	(7)
KØUAA	80	(7)

NE

WBØYZN	13,203	(4)
KCØQR	8,456	(4)
KCØOG	5,586	(4)
WDØBQM	3,096	(4)
NØBTN	1,782	(2) B
KL7MH/Ø	1,496	(3)
WØKAV	240	(2) A
WBØHXY	24	(2) D
WBØVGR	12	(1) B

CANADA

VE2ADE	270	(1) B
XJ3KZ	2,052	(1) B
VE3BFM	153	(4)
VE5LY	33	(4)
VE5BEB	2	(2) B
VE7ASI	300	(4)

EUROPE

CT1M	30	(1) B
DLØWW	90,848	(6)
DL3MBG	18,291	(2) B
DG8SAB	8,636	(2) B
DL8ZAW	440	(2) B
F6KAW	212,826	(5)
F1FJL/p	11,067	(3)
F1EWP/p	3,276	(1) B
GJ4ICD	45,849	(2) B
G6HCV	779	(2) B
G1EMJ	592	(1) B
G6CSY/p	240	(1) B
HG1S	15,936	(4)
HG5KF	5,320	(8)
HG8VF	5,217	(2) B
HG5ZC	2,475	(1) B
HG8KAX	2,457	(5)
HG5KFV	2,016	(5)
HG5ABC	1,292	(2) B
HG1UJ	1,239	(2) B
HG1KZH	1,134	(5)
HG6VV	969	(3)
HG4YV/3	836	(1) B
HG5UA	825	(1) B
HGØKDA	817	(5)
HGØMJ	602	(2) B
HG5KHT	564	(1) B
HG1ZV	544	(1) B
HG1DRR	495	(1) B
HG7LX	490	(3)
HG5HD	476	(2) B
HGØEG	396	(1) B
HG5CW/M	390	(8)
HG2SF	385	(2) B
HG2TS	380	(1) B
HG1XU	336	(2) B
HG5AIY	330	(1) B
HG8QG	312	(1) B
HG5AJZ	297	(1) B
HG7SQ	270	(1) B
HG5AJC	261	(1) B
HG6VW	234	(1) B
HG5AGP	232	(1) B
HG5CI/2	210	(4)
HG7PJ	208	(1) B
HGØKLZ	170	(5)
HG5KV	160	(1) B
HG1RA	152	(2) B
HG3HX	140	(1) B
HG2EOS	91	(2) B
HGØKHQ	84	(5)
HG1SO	70	(3)
HG5KHS	28	(1) B
HG5KDW	21	(1) B
HG7NI	20	(3)
HG8GB	12	(1) B
HG5OZ	3	(1) B
HG7UV	3	(1) B
HG7RS	2	(7)
HG7JAY	2	(1) B
I4EAT/3	182,728	(5)
I4BXN	31,508	(2) B
I4LCK/4	17,484	(8)
I6IQU/6	11,628	(3)
I4XCC	9,720	(2) B
IW5AVM	7,850	(4)
IW5BML	7,527	(1) B
I1JTQ	5,208	(1) B
I4RHP	4,810	(2) B
IW4ADT/4	3,712	(5)
IK6EIW	3,627	(1) B
IW2AEN	2,700	(3)
IW2BZY	2,635	(3)
HB9CWA/IA5/p	1,820	(8)
I3VYK	1,675	(1) B
IW4ATB	1,377	(1) B
I4KYO	1,239	(3)
IW9AVT	1,216	(1) B
IWØAYO	1,200	(1) B
IW3EYG	1,184	(8)
IW9AQS	924	(1) B
IW5APQ	902	(1) B
IW8AOK	855	(1) B
ISØAGY	805	(1) B
IOØKHY	792	(3)
IW6AGS	468	(1) B
I5XEI	407	(1) B
I4JED/4	360	(2) E
I3BGC	300	(1) B
I2LVN	299	(3)
IW5BDZ	286	(1) B
I4MMQ	252	(3)
IW6AEG	238	(1) B
IØUZF/1	144	(8)
IW6AFT	66	(1) B
I3RMJ	55	(3)
I6CTJ	49	(3)
IO5MZY	25	(1) B
IW3EYF	9	(1) B
OH2AVP	8	(1) B
OK1KEI	4,410	(7)
OK3TAO/p	1,909	(1) B
OK3WBC	396	(1) B
OK1KKI	216	(1) B
OK1USB	208	(1) B
OZ7HVI	748	(6)
OZ1IZB	60	(1) B
OZ1ESS	6	(1) B
YO5DJM/p	1,216	(1) B
YO5KAS/p	792	(8)
YO5LH/p	658	(1) B
YO6AFP	645	(1) B
YO9AFE/p	630	(8)
YO4ATW/p	560	(8)
YO5CRI/p	546	(1) B
YO5BPE/p	462	(8)
YO4XF	374	(1) B
YO5TP/p	364	(1) B
YO9AZD	364	(1) B
YO4BBH	340	(1) B
YO4XZ	275	(1) B
YO5BLD/p	261	(1) B
YO4BZC	170	(1) B
YO9KXC	170	(1) B
YO8BGE/8	165	(8)
YO8CQU/8	162	(1) B
YO9CAD/6	150	(7)
YO4YT	144	(1) B
YO4BII	99	(1) B
YO3DLO	80	(7)
YO9AGN	70	(1) B
YO3AHU	51	(1) B
YO5CQK	51	(1) B
YO5AEX	48	(1) B
YO9BSY	45	(7)
YO3DKA	42	(7)
YO3FBH	42	(7)
YO9CXV	42	(7)
YO6MD	33	(1) B
YO6ADW	27	(7)
YO6AIT	24	(7)
YO5CEA	21	(7)
YO5DDD	21	(1) B
YO6ALD	21	(1) B
YO5CEU	18	(7)
YO5NU	14	(1) B
YO5DPA	14	(1) B
YO5KMM	14	(1) B
YO9CAB	14	(7)
YO3BTC/7	12	(1) B
YO5TS	5	(7)
YO5BMT	5	(7)
YO5DGG	5	(7)
YO5KTB	4	(7)

OTHER

CX8BE	198	(4)
ZS6WB	8	(2) A

JAPAN

1st District

JE1KUR/1	17,955	(8)
JA1ZCX/1	16,107	(6)
JO1BSM	15,372	(1) A
JP1AVZ	12,900	(1) A
JQ1BVI	8,514	(1) A
JI1WLL	3,705	(2) B
JA1BWD	3,264	(1) E
JH1FJK	2,448	(1) E
JM1GHT	2,268	(1) A
JM1WZP	2,108	(3)
JE1RXJ	1,917	(2) A
JK1OTP	1,606	(1) A
JP1DMX	1,479	(1) A
JE1PIK	1,456	(1) E
JM1CAX	1,224	(2) D
JA1RJU	1,080	(2) A
JH9AMJ/1	1,040	(1) A
JP1TBD	780	(2) A
JQ1OKG	540	(1) A
JM1GPV	520	(1) D
JM1LRQ	512	(2) A
JK1GLA	480	(1) B
JA1GAL	420	(4)
JO1RUR	400	(1) A
JS1LGF	377	(1) A
JL1BYZ	312	(1) A
JO1EMC	300	(2) A
JJ3OLZ/1	273	(1) A
JP1TRJ	143	(1) A
JS1BGW	135	(1) A
JK1REJ	108	(1) A
JL1MWI	70	(1) D
JN1WXW	70	(3)
JP1MYW	70	(1) A
JF1FZI	64	(1) E
JK1VVN	64	(1) A
JQ1POK	48	(1) A
JP1FRD	40	(1) D
JHØDYN/1	30	(1) A
JA1AAT	25	(1) A
JO1KTD	25	(1) A
JR6JOE/1	25	(1) A
JL1MSO	20	(1) A
JJ1TQA	16	(1) A
JM1GDA	12	(7)
JA1DTS	6	(1) B
JO1KSD	4	(1) A
JP1EMG	1	(7)
JQ1QFD	1	(1) B

2nd District

JG2CAU	3,267	(2) A
JR2ZIA	1,152	(5)
JJ1BTC/2	702	(1) A
JA2YKA	430	(1) D
JA2KSI	364	(2) A
JJ2KGE	160	(1) A
JG2NKF	72	(1) A
JR2JZO/2	60	(8)
JF2NFC	12	(1) A
JH2WHS	4	(1) A

3rd District

JI3BFG	6,480	(3)
JA3QOS	5,082	(4)
JJ3SFW	2,856	(4)
JH3HBF	1,890	(2) A
JR3BVX	1,872	(2) A
JL3AZA	792	(1) A
JJ3IUZ	720	(1) A
JF3ZAH	247	(5)
JG3ZDK	240	(1) A
JH3YXC	170	(5)
JJ3VMD	119	(1) A
JJ3KGP	78	(1) A
JM3CLU	44	(7)
JJ3VPY	30	(7)
JL3FIS	4	(1) A
JR3ZXP	2	(7)
JG3HFE	1	(1) A

4th—10th Districts

JA4GXS	192	(1) A
JE4OJD	105	(1) B
JJ3LJU/4	1	(8)
JA6RJK	18,612	(1) A
JH7VBI/7	6,090	(2) A
JH7YAA/7	624	(6)
JF7NNI	90	(1) B
JH7VEP	12	(1) A
JH7ACC/Ø	15,064	(1) A
JHØUSD	204	(3)

Here shown left to right are Chen Chang-I, Ministry of Communications official in charge of amateur radio regulation in Taiwan; H.C. Hu, Director of the China Radio Association; Senator Barry Goldwater, K7UGA; and Tim Chen, BV2A/BV2B, Standing Supervisor of the China Radio Assoc. and Chairman of the Amateur Radio Commission.

Earlier this year Senator Barry Goldwater and five other U.S. amateurs operated as BV0BG from Taiwan, making over 7,000 QSO's in just a few days. Here one of these amateurs tells how it was done and what was accomplished.

Goldwater DXpedition To Taiwan

BY DAVID R. SIDDALL*, K3ZJ

Most DXers know that for many years Tim Chen was the only amateur permitted to operate from Taiwan. He is still active as BV2A on CW and BV2B on SSB. However, new BV stations now have joined in on the bands, and occasionally a special "BV0" DXpedition is heard. This is the story of the BV0BG DXpedition, which was operated by Senator Barry Goldwater and some Washington, D.C. amateurs during early January 1986.

Introduction

During the spring of 1984 Tim, on behalf of the China Radio Association, invited Senator Barry Goldwater to operate his amateur radio station from Taiwan and to bring some other amateurs with him to make it a DXpedition. That conversation led to the BV0BG DXpedition. Despite poor conditions due to the low sunspot count, over 7,000 QSO's were completed with all areas of the world in just a few days. Among these were the first QSO's ever made from Taiwan on 80 and 160 meters.

This was not an ordinary garden-variety type of DXpedition—i.e., a group of operators traveling to an isolated or even unpopulated island or area for the sole purpose of making as many QSO's as possible. The fact is that Taiwan is a lovely, modern island with a population of 18 million persons. The city of Taipei itself, where BV0BG was established and operated, has a population of over 2 million persons. Taiwan has many people trained and knowledgeable in today's electronic culture and exports electronic goods all over the world. In fact, it would be unusual for one in the United States or western Europe not to own a calculator, clock, radio, or other electronic device manufactured in Taiwan.

Thus, it would seem that Taiwan, like her Pacific neighbors South Korea and Japan, should have many persons interested in electronics and pursuing amateur radio. Such is not the case, however,

**9763 Oleander Ave., Vienna, VA 22180. The author coordinated the BV0BG DXpedition. For many years he was a communications attorney on Capitol Hill and president of the Capitol Hill Amateur Radio Society (W3USS). Presently he is a senior attorney with the Federal Communications Commission.*

Say You Saw It In CQ

Senator Barry Goldwater, K7UGA/BV0BG, in QSO during public ceremonies demonstrating amateur radio to Republic of China officials and the press.

After making QSO's, Senator Goldwater was interviewed by Republic of China press about amateur radio. Stories and pictures were on the front pages of all Taiwan newspapers the next day.

Senator Goldwater during the China Radio Association program given in his honor. Behind the Senator members of the press crowd around the BV0BG station.

and Senator Goldwater's interest in accepting Tim's invitation stemmed from his belief that amateur radio is an unparalleled tool for developing interest and promoting expertise in the electronic professions. The particular attributes of Taiwan and amateur radio would seem an excellent match.

Purpose

During the early planning stages the Senator's reasons for making this trip became clear. The three principal purposes for the trip were to promote U.S.-Taiwan understanding; to promote on Taiwan a greater understanding of amateur radio and its benefits; and to demonstrate to Taiwanese the worldwide international goodwill and recognition accrued by amateur radio operation and to bring to the attention of amateurs worldwide this small island nation. Because of his long-standing personal relationship with Taiwan as a friend, Senator Goldwater was in a unique position to bring the benefits of amateur radio to the attention of the Taiwanese and their highest government officials.

The first goal, to increase understanding between Americans and Taiwanese, was accomplished through personal contact with officials of the government of the Republic of China, members of the China press, members of the China Radio Association, and others. Numerous personal contacts hopefully contributed to better understanding between the people of our two nations.

The second goal was more specific—to bring to Taiwanese officials and people an understanding of amateur radio and the benefits of increased individual investigation and experimentation with electronic communications methods and modes. A byproduct of interest to DXers, of course, will be more licensed amateurs and increased privileges and activity. But unlike most DXpeditions, our purpose was not to work out the bands as if there were no tomorrow. Rather it was to encourage an increase in amateur activity on a sustained basis with the expectation that it will work in Taiwan as it has in the United States, Japan, and other coun-

The five operators who traveled from Washington pose with two of Taiwan's operators. Left to right are Dave Siddall, K3ZJ; Jeff Hutchinson, W4PBC; Larry Kettlewell, W3HHG; Roland McElroy, K4OCI; Shane Tang, BV2FA; Tom Warren, K3TW; and Tim Chen, BV2A/BV2B.

tries to increase electronic engineering and radio communication skills and benefit the nation as a whole.

A reception and dinner hosted by the China Radio Association for Senator Goldwater and DXpedition members was attended by a number of government officials, including the Minister of Communications, Dr. Lien Chen. The story was carried nationally on television news, and accounts with pictures were carried the next day by both the domestic and international editions of the newspapers. This brought amateur radio to the attention of the Chinese public both on Taiwan and abroad in an unprecedented fashion. Government officials with whom Senator Goldwater conferred, including President Chiang Ching-kuo, were very interested in learning just what the Senator was doing with the ham radios in all the news accounts!

The third goal of demonstrating the international goodwill aspects of amateur radio and bringing Taiwan favorably to the attention of the world was realized through our contacts with over 7,000 amateurs worldwide. News of our operation was carried by amateur publications in Europe, North America, and Japan even before we arrived in Taiwan, and literally thousands of amateurs all over the world were keeping watch for our signals from Taipei.

Preparation

Unexpectedly, an opportunity arose to carry out the DXpedition in mid-December 1985. Although some of our plans had been months in the making, we had just two weeks in which to pull it together, and these two weeks included the Christmas and New Year's holidays!

Some of our expected operators couldn't make arrangements to take vacation from work with only two weeks notice, but a group of seven was established and final preparations completed. Joining us from the Capitol Hill Amateur Radio Society were Roland McElroy, K4OCI, chief of staff to Senator Sam Nunn of Georgia, and Larry Kettlewell, W3HHG, professional staff member of the Senate Select Committee on Intelligence. Also on the team were Tom Warren, K3TW, a professional engineer with the government who often has provided technical assistance to the Capitol Hill Society, and Jeff Hutchinson, W4PBC, a commercial radio operator and the manager of the laser marketing department of a large corporation and also a long-time personal friend of Mr. Chen Chang-I, the Taiwan Ministry of Communications official directly in charge of amateur radio regulation. Joining us in Taipei was Karl Renz, K4YT, another electronics engineer with the government and an experienced DXpeditioner.

The Saturday before New Year's we met at my QTH to discuss the trip and

Dave Siddall, K3ZJ, tightens the boom-to-mast mount on the Hy-Gain 153BAS three-element 15 meter beam.

build the antennas. Hy-Gain donated three beams for the operation: two elements for 40 meters (7-2), 3 elements for 20 meters (203BAS), and 3 elements for 15 meters (153BAS). I threw in two used Ham-M rotators and several lumped inductance sloppers capable of 15/40/80/160 operation to be on the safe side. We weren't at all sure what antenna facilities would be feasible in the middle of Taipei.

We built, color-coded, then disassembled and repacked each antenna to ensure that all hardware was included and measurements correct. After that we went over our final plans. Finally I succeeded in connecting with Tim Chen on the phone and ascertained that he had received the cabled messages and was also in the midst of preparations for our visit. He kindly offered the use of some transceivers and two linear amplifiers, which we readily accepted. We did bring two more linears, including one that covered 160 meters, as insurance against component failures.

Tim had some additional news for us. Although normally BV operators and DXpeditions are limited to 10, 15, 20, and 40 meters, it was likely that Senator Goldwater's specific request for a CW and a SSB frequency on 80 meters would be granted. Ours would be the first operation ever to operate 80 meters from BV!

A crisis occurred less than two days before we were to leave. It seems that the long antenna boxes couldn't be fitted into the baggage compartment of our flight from Washington to Los Angeles. Worse, the airline wouldn't guarantee delivery of the antennas in time for our connecting flight to Taipei even if we immediately shipped them air freight. Fortunately, Jeff and his wife came to the rescue. Mrs.

K4OCI and K4YT watch as CW operator W4PBC tries phone for a change of pace.

Hutchinson is an employee of Piedmont Airlines, and that airline graciously agreed to fly the antennas to Los Angeles in time to meet us.

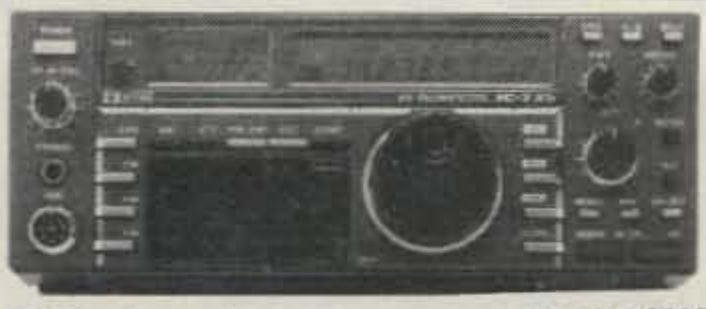
Travel

Very early New Year's Day the five of us gathered at Washington Dulles International Airport for the trip. During the flight we met and discussed various details and plans, including how we would deal with problems associated with low numbers of sunspots, mid-winter operation, and propagation forecasts which showed few openings to the eastern United States and western Europe. We also made contingency plans in case the antennas weren't in Los Angeles when we arrived.

Luck was with us, however. The beams were waiting for us in Los Angeles, just as Piedmont had promised. All we had to do was find the China Airlines terminal and get to it all the boxes and carry-on luggage! It was quite a site on the airport bus, but we made it! I had made advance

Station in middle of the photo was the second location of BVØBG. It also is the QTH of the China Radio Association's club station, BV2C.

Say You Saw It In CQ



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EX-243 Electronic keyer unit	50.00	
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FL-53A 250 Hz CW filter (2nd IF)	96.50	**89.95**
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FL-32 500 Hz CW filter	59.50	
FL-34 5.2 kHz AM filter	49.50	
BC-10A Memory back-up	8.50	
SM-5 8-pin electret desk mic	40.00	
MB-5 Mobile mount	21.99	

Other Accessories:	Regular	SALE
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CR-64 High stab. ref. xtal (745/751)	56.00	
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IC-471H 75W 430-450 SSB/CW/FM	1149.00	**989.95**
AG-35 Mast mounted preamplifier	84.95	
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PS-25 Internal power supply for (A)	99.00	**89.95**
PS-35 Internal power supply for (H)	169.00	**149.95**
PS-15 External power supply	149.00	**134.95**
SM-6 Desk microphone	40.00	
EX-310 Voice synthesizer	41.25	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	12.50	
UT-15S UT-15S w/TS-32 installed	79.95	
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IC-490A 10W 430-440 SSB/FM/CW	649.00	**569.95**
VHF/UHF/1.2 GHz FM	**Regular**	**SALE**
IC-27A Compact 25W 2m FM w/TTP mic	389.00	**349.95**
IC-27H Compact 45W 2m FM w/TTP mic	429.00	**379.95**
IC-37A Compact 25W 220 FM, TTP mic	449.00	**349.95**
IC-47A Compact 25W 440 FM, TTP mic	489.00	**429.95**
PS-45 Compact 8A power supply	112.95	**99.95**
UT-16/EX-388 Voice synthesizer, 47A	31.00	
SP-10 Slim-line external speaker	31.95	
IC-3200A 25W 2m/440 FM w/TTP	569.00	**499.95**
UT-23 Voice synthesizer	31.00	
AH-32 2m/440 Dual Band antenna	32.95	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	20.18	
Larsen PO-MM Magnetic mount	19.63	
IC-1271A 10W 1.2 GHz SSB/CW Base	1049.00	**929.95**
PS-25 Internal power supply	99.00	**89.95**
EX-310 Voice synthesizer	41.25	
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IC-120 1W 1.2 GHz FM Mobile	499.00	**449.95**
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BP-4 Alkaline battery case	13.75
BP-5 425mah/10.8V Nicad Pak - use BC35	49.50
CA-5 5/8-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	10.00
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arrangements with China Airlines to carry the antenna boxes, and wonder of wonders (or so it seemed to us at the time) the China Airlines personnel were expecting us, accepted the unusual cargo, and every box arrived with us in Taipei 15 hours later.

That arrival was late Thursday evening, January 2, by Taipei time. We were welcomed at the airport by Tim and a delegation of China Radio Association and government officials. Soon we were off to our hotel to try to recover from over 24 hours of continuous travel. It is worth noting that despite the superb facilities, this was the last night that all of us slept. Until we left one week later a night crew was on duty for 40/80/160 work, and most of us either went to bed after midnight or got up sometime between 2 and 5 a.m. in order to cover various openings and sunrise/sunset paths.

Operations

During the planning stage a number of critical decisions were made which in retrospect significantly contributed to the success of our operation. Some of these may be of interest to others planning DXpeditions to distant areas under marginal low sunspot propagation conditions. For example, we decided to transport antennas and rotators which we could use and then leave for the future use of BV operators. Hy-Gain kindly donated the three beams. In high sunspot years wire antennas would have been sufficient, but under the present low sunspot conditions good beams are necessary to reliably work outside of Asia and the Pacific areas. Fortunately, the China Radio Association generously lent us enough transceivers and amplifiers so that we were able to use our transportation allowances principally for the antennas and secondarily for two back-up amplifiers.

Another initial decision was to ask Tim if two separate QTH's could be arranged for the station. Tim came through for us, and thus we were able to operate both SSB and CW simultaneously on the same band at the same time. We had only one set of beams, so one station was always on a dipole during these operations. Reports from U.S. operators who worked us on both modes at close to the same time consistently noted from 2 to 4 "S" units difference between the two signals. These reports confirmed the benefit of the beams for the most difficult paths. But of course, these presented the worse case, and even then we *did* make it with dipoles, although with significantly weaker signals, which resulted in fewer stations worked per hour compared to the station with the beam. For more local Asia and Pacific work the difference was less important, of course, and having two stations simultaneously on what at times was the only open band permitted us to

K3ZJ, BV2FA, and K4OCI on the roof of BV2C. Antennas had to be constructed and positioned to avoid numerous television antennas and poles (one is to the right of K4OCI) which support blinking red aircraft warning lights.

make the best of very limited time and propagation.

On the other hand, two stations meant having to coordinate schedules for the operators to cover the two different shacks. We didn't want all the operators to be at one station at the same time while the other one was unused, or everyone to be in the electronics market shopping when the bands opened. Due to tremendous cooperation among the operators, almost without exception BV0BG was on the right bands at the right time as far as our resources and other obligations permitted.

This type of operation also meant that some of us didn't see each other for several days at a time. Both stations were some distance from our hotel, so one didn't just stop by for a casual visit. We communicated among ourselves by notes placed under each other's hotel-room doors. Logs were slipped under my door, and I counted up contacts by hand, made up a basic schedule, and left a general recap and the next day's operating positions, schedule, and strategy under each operator's door late at night.

The taxi drivers and late-night employees of the hotel are probably still scratching their heads over this crazy American group with Senator Goldwater that came and went at all hours of the day and night, seemingly without rhyme or reason. How many guests have they seen consistently come in or get up between 2 and 5 a.m. (1800–2100 GMT) to cover the 40 meter short-path opening to Europe and long-path opening to the U.S. and 20 meter short-path opening to the U.S. and South America?

Bringing several extra amplifiers rather than transceivers also proved to be the right move. When a failure did occur, we were able to immediately run a replacement and fix the failure (power-supply components) at our leisure when the bands were dead. Any needed component was obtainable in the Taiwan electronics market! The transceivers themselves performed flawlessly.

After we arrived in Taipei Tim an-

Minister of Communications Lien Chen presents the BV0BG license to K7UGA. Between the two in the back are K3ZJ, W3HHG, and K3TW.

The China Radio Association QSL lists the calls of station licenses.

REPUBLIC OF CHINA

BV2A BV2B BV2C

BV2DA BV2FA BV2GA

BV5HA BV6IA BV7JA

BV7KA BV7LA

MEMBERS OF CHINA RADIO ASSOCIATION

Say You Saw It In CQ

nounced that not only did Senator Goldwater's license permit operation within certain segments of 80 and 75 meters, but also on a segment of 160 meters. Our "spare" wire antenna and amplifier both were chosen because they covered 160 meters as well as other bands, so we were able to make the most of this unexpected bonus.

This is not to say that there weren't a few problems, but only that our planning avoided many pitfalls. Some things—such as S9 QRN from automobiles, signs, and appliances which one normally encounters in the middle of a modern and thriving city such as Taipei—couldn't be resolved. Another peculiarity were the rooftops to the tall buildings we were lucky to have for antennas. We were surprised to find these obstructed by 25 foot lightning and lighting devices all over Taipei. These massive poles severely limited turning any size beam antenna placed atop the highest portion of the roofs. On the other hand, we were able to hang a full-size 80 meter dipole high up off one of these poles, and even extended it to a full-size 160 dipole when our other antenna didn't seem to work well enough. There wasn't room for phased arrays or other "country" antennas, but we made use of what we had available.

Conclusion

By the time we closed down at 0042 GMT on January 10 over 7,000 QSO's were in the BVØBG log. Contact had been established with the remotest parts of the globe and all bands had been used, 160 through 10 meters, both phone and CW. Our special advance planning and efforts to work the most difficult paths despite poor propagation conditions had paid off with hundreds of QSO's logged with both the eastern United States and western Europe.

The major diplomatic purposes of our trip also were completed successfully. Fast friendships between the individuals of the China Radio Association and ourselves had been made. A favorable impression of amateur radio had been conveyed to the Chinese press and officials. We owe particular thanks to persons with the China Radio Association and the Ministry of Communications for the Republic of China for their tremendous assistance and friendship.

Presently there are 11 individually licensed stations on Taiwan. These are BV2A and BV2B, belonging to Tim Chen; BV2C, a club station; BV2DA, Feng, and BV2FA, Shane, both of whom assisted our operation and are active on the air; and BV2GA, BV5HA, BV6IA, BV7JA, BV7KA, and BV7LA. As interest increases, more licenses likely will be permitted. In some small way we hope that we contributed to the long-term growth and health of amateur radio among our friends on Taiwan. CQ

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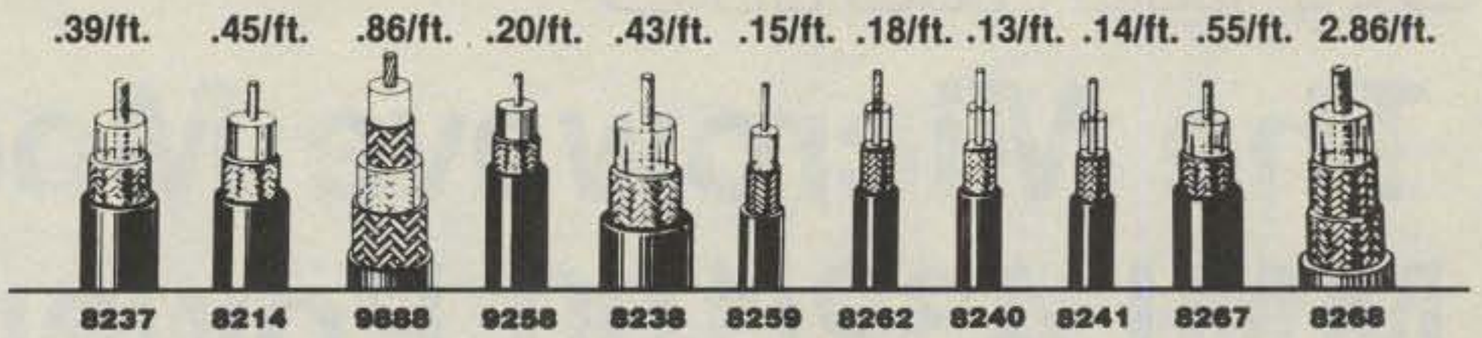

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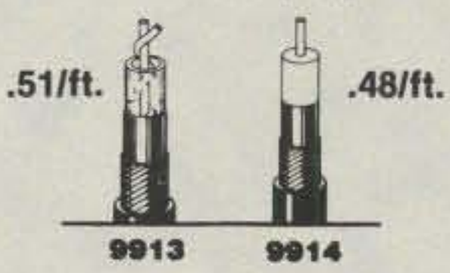
8214-8/U TYPE, Cellular Polyethylene Insulation
9888-8/U TYPE, Cellular Polyethylene Insulation & Double Braid Shield
9258-8/X TYPE, Cellular Polyethylene Insulation
8238-11/U JAN-C-17A, Polyethylene Insulation
8259-58 A/U JAN-C-17A, Polyethylene Insulation
8262-RG 58 MIL-C-17F, Polyethylene Insulation
8240-58/U JAN-C-17A, Polyethylene Insulation
8241-59/U JAN-C-17A, Polyethylene Insulation
8267-213/U MIL-C-17D, Polyethylene Insulation
8268-214/U MIL-C-17F, Polyethylene Insulation & Double Braid Shield



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Connectorized Coaxial Cables

9356-RG- 8/U TYPE with PL259 Connectors

Amateur Radio Coaxial Cables Attenuation/Loss in DB/100 Feet

Frequency Meters	8237	9888 8214	9258	8238	8259 8262	8240	8241	8267	8268	9913	9914
80	.48	.27	.60	.34	.79	.74	.62	.48	.48	.21	.35
40	.52	.38	.84	.46	1.1	1.0	.80	.52	.52	.31	.42
20	.77	.58	1.2	.68	1.6	1.5	1.1	.77	.77	.45	.57
15	.96	.72	1.5	.84	2.0	1.9	1.3	.96	.96	.55	.70
10	1.3	.88	1.7	1.0	2.3	2.2	1.6	1.3	1.3	.64	.82
6	1.6	1.2	2.5	1.3	3.3	3.1	2.2	1.6	1.6	.90	1.1
2	2.7	2.2	4.5	2.4	5.9	5.8	4.0	2.7	2.7	1.7	2.0
70 cm	5.2	4.3	8.4	4.4	12.9	11.2	7.8	5.2	5.2	3.1	3.7

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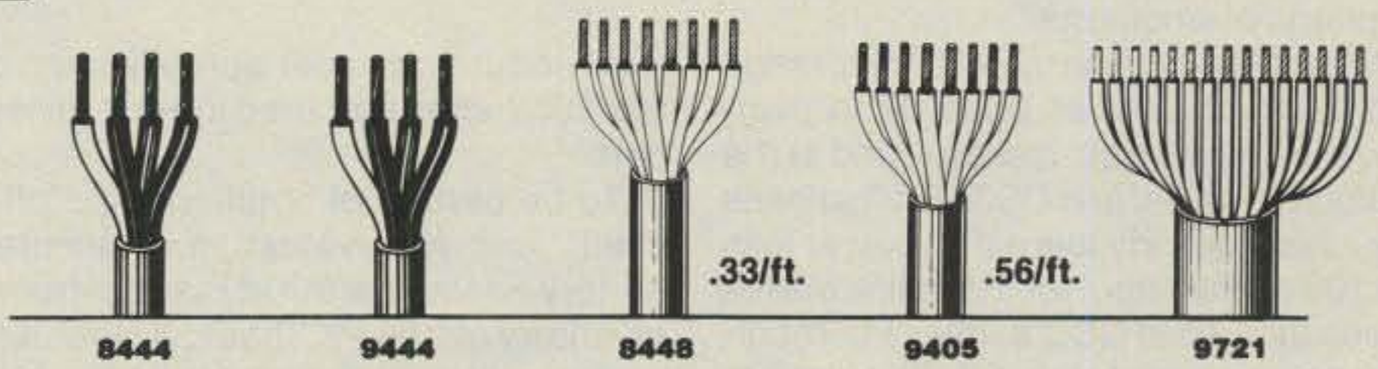
- For specific technical data on these cables see the Belden master catalog.



Antenna Rotor Cables

8444-#22 AWG 4 Conductor PVC Cable
9444-#20 AWG 4 Conductor PVC Cable
8448-6 #22 AWG and 2 #18 AWG Conductors PVC Cable
9405-2 #16 AWG and 6 #18 AWG Conductors PVC Cable
9721-#16 AWG 8 Conductor PVC Cable

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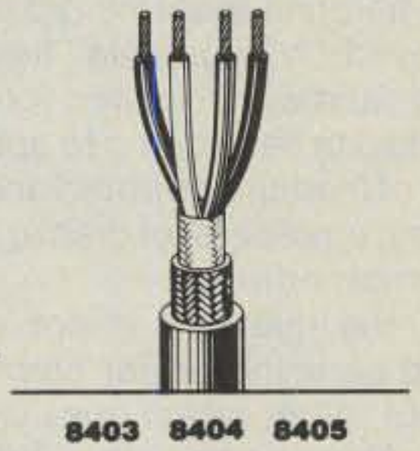
8403-#20 AWG 3 Conductor with 89% Braid Shield .45/ft.
8404-#20 AWG 4 Conductor with 87% Braid Shield
8405-#20 AWG 5 Conductor with 83% Braid Shield



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CQ REVIEWS:

BY STEVE KATZ*, WB2WIK

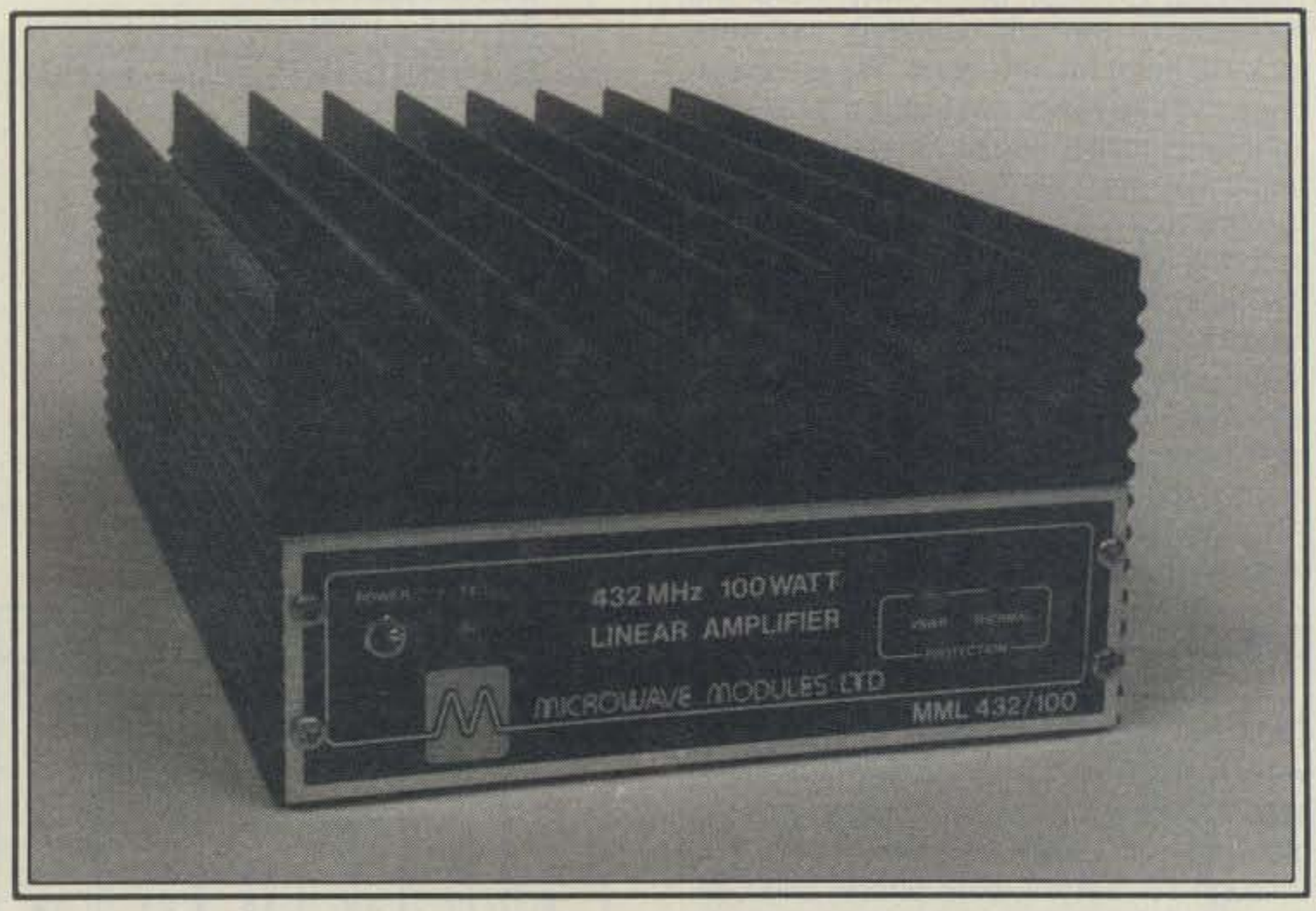
The Microwave Modules Ltd. MML432/100 Power Amplifier

Seventy centimeter operators rejoice! There is an affordable, desk-top power amplifier which not only meets all its claimed specifications, but exceeds them in nearly every area. The Microwave Modules Ltd. MML432/100, manufactured in Liverpool, England, is just such an amplifier, and it should be enormously popular with users of the 430–450 MHz band.

As new occupants to the 70 cm terrestrial weak-signal scene become quickly aware, the barefoot output power of most transverters and multimode transceivers (except perhaps the IC471H) is insufficient for most work on the band. True, you can make enjoyable contacts on 432 MHz SSB with just 10 watts output power, but you'll find the majority of stations running at least 100 watts, making for a 10:1 disparity in signal reports while making the QRP station a "bunny rabbit" who can hear many more stations than can be contacted. Contests become frustrating, and brief-duration band openings often don't allow the opportunity for low-powered UHF stations to capitalize on unique atmospheric phenomena.

FM simplex users in the 440 MHz range need as much ERP as possible to overcome the severe path losses found at the centimeter waves, and OSCAR 10 satellite enthusiasts quickly learn that power less than 100 watts output for the uplink makes for less than solid QSO's unless cumbersome antenna systems (20 dB gain) are employed. "Videomania" has also hit the 70 cm band with renewed force, and ATV enthusiasts have come to appreciate the worth of medium-powered and very linear transmit amplifiers for drastic increases in station capability.

So, the question is not whether we should be using power amplifiers on 70 cm, but rather *which ones* we should be using. At my home station I'd used about every commercially-made solid-state 70 cm power amplifier available on the amateur market, or at least I thought I had. The MML432/100 was a product I had only read about and never actually seen until late 1985 when I secured the unit reviewed here.



The Microwave Modules MML432/100's most distinguishing characteristic is its enormous heatsink, which offers > 338 square inches of surface area for enhanced convection cooling.

To be certain of obtaining an "off the shelf" unit for evaluation, I selected a factory-sealed carton at random from the inventory of The PX Shack, a New Jersey based authorized distributor for Microwave Modules products, and gave it a thorough "burn in" during the ARRL January VHF Sweepstakes prior to making any laboratory measurements. Wiring the unit into my home station was an easy 60-second operation, and the results were immediately gratifying. The MML432/100 was first used as the "final" amplifier, running its 100 watt output directly to my antenna system, and then it was used as the "driver" amplifier for a higher powered vacuum-tube (3CX800) amplifier. I should mention that the MML432/100 has too much output for the cathode of the 3CX800 amplifier, so a length of RG58A/U coaxial cable was installed between the solid-state amp and the kilowatt final to limit drive power to about 25 or 30 watts RG58A/U makes a terrific 50 ohm attenuator at 432 MHz, and is so much easier to use than bulky, resistive pads which often don't look much like 50 ohms at all.

Let me get back on the track. The MML432/100 is a handsome unit measuring 13.25"D × 6.875"W × 3.94"H and weighing 8.8 lbs. Its enormous black-anodized aluminum heatsink is the amplifier's most outstanding characteristic. At first glance you'd guess this was a 500 watt unit, for its heatsink surface area is on par with that found on such powerful commercial products. All the vertical heatsink fins (nine of them) are additionally serrated to further increase the surface area and enhance convection cooling. The unit's front panel has a "power" switch which when activated applies power to the amplifier's internal RF transfer relay and puts the unit "on line," and four LED status indicators which will be described later. The rear panel has type "N" RF input and output connectors (good choice), a fuse holder, DC power cable wired permanently through a bushing, and an RCA phono-

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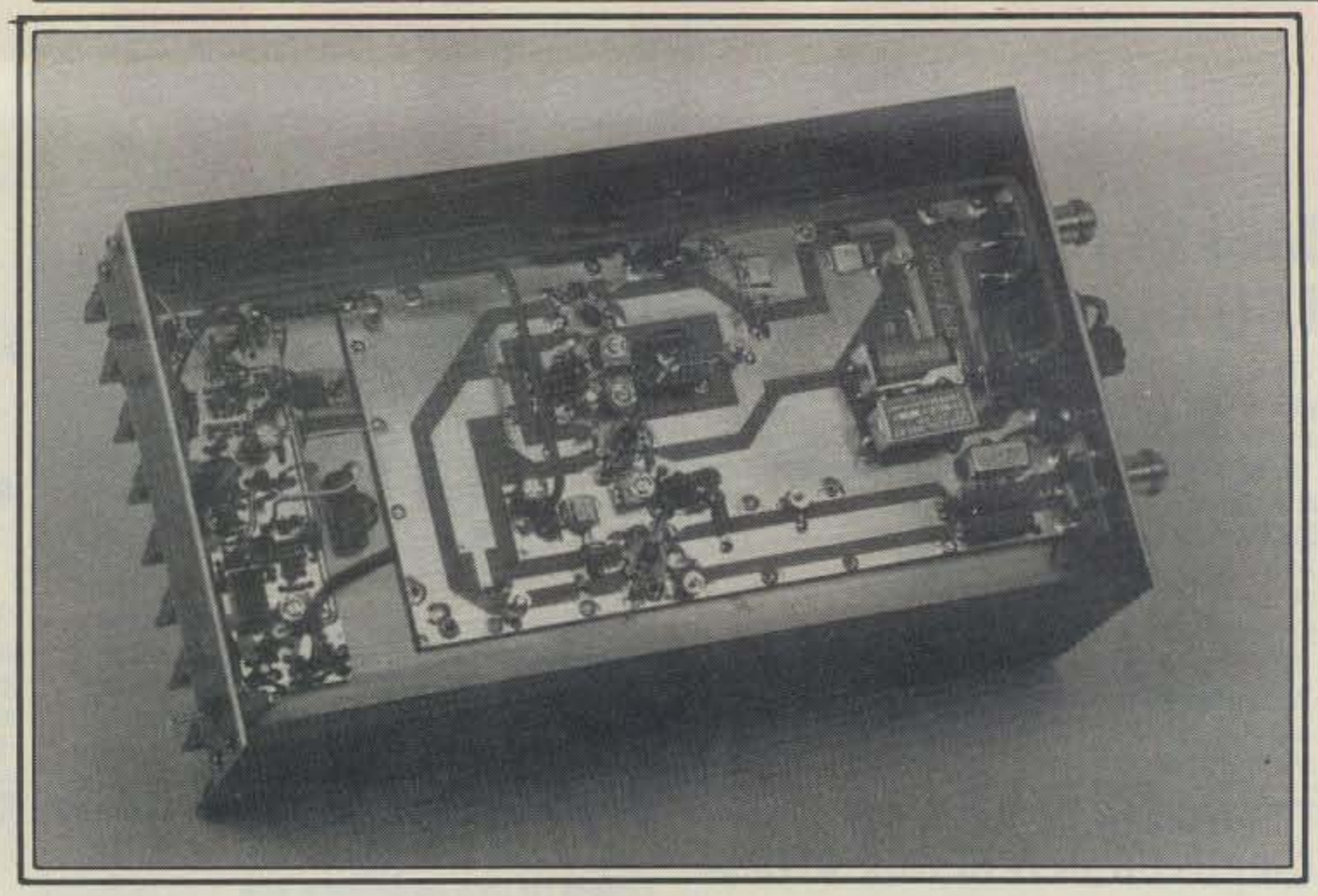


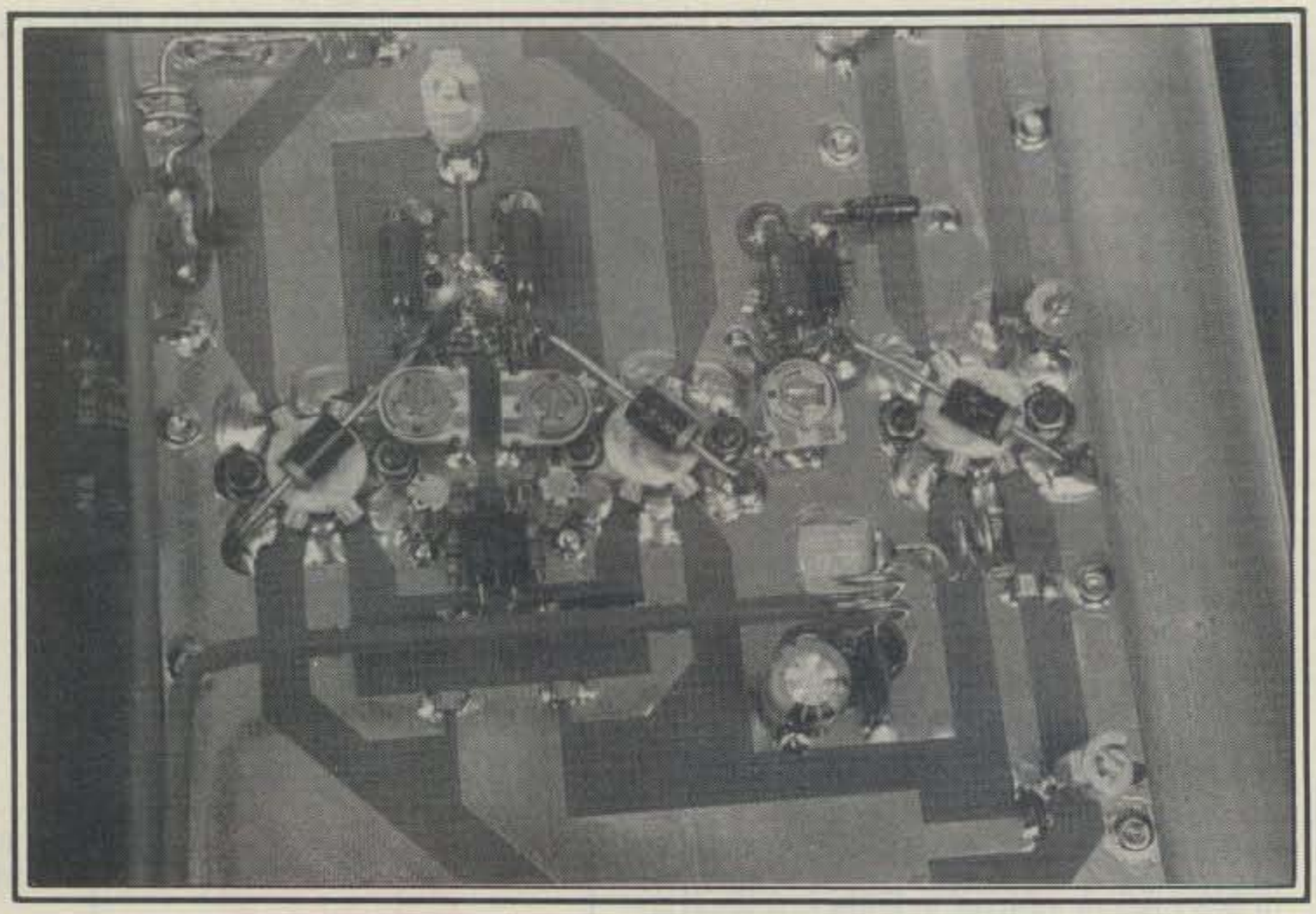
Internal construction of the MML432/100 is just beautiful, with careful attention to detail. The sophisticated control circuitry is on the separate PCB to the left.

type receptacle for the application of a PTT (ground on xmit) signal should "hard," rather than RF VOX, switching be used.

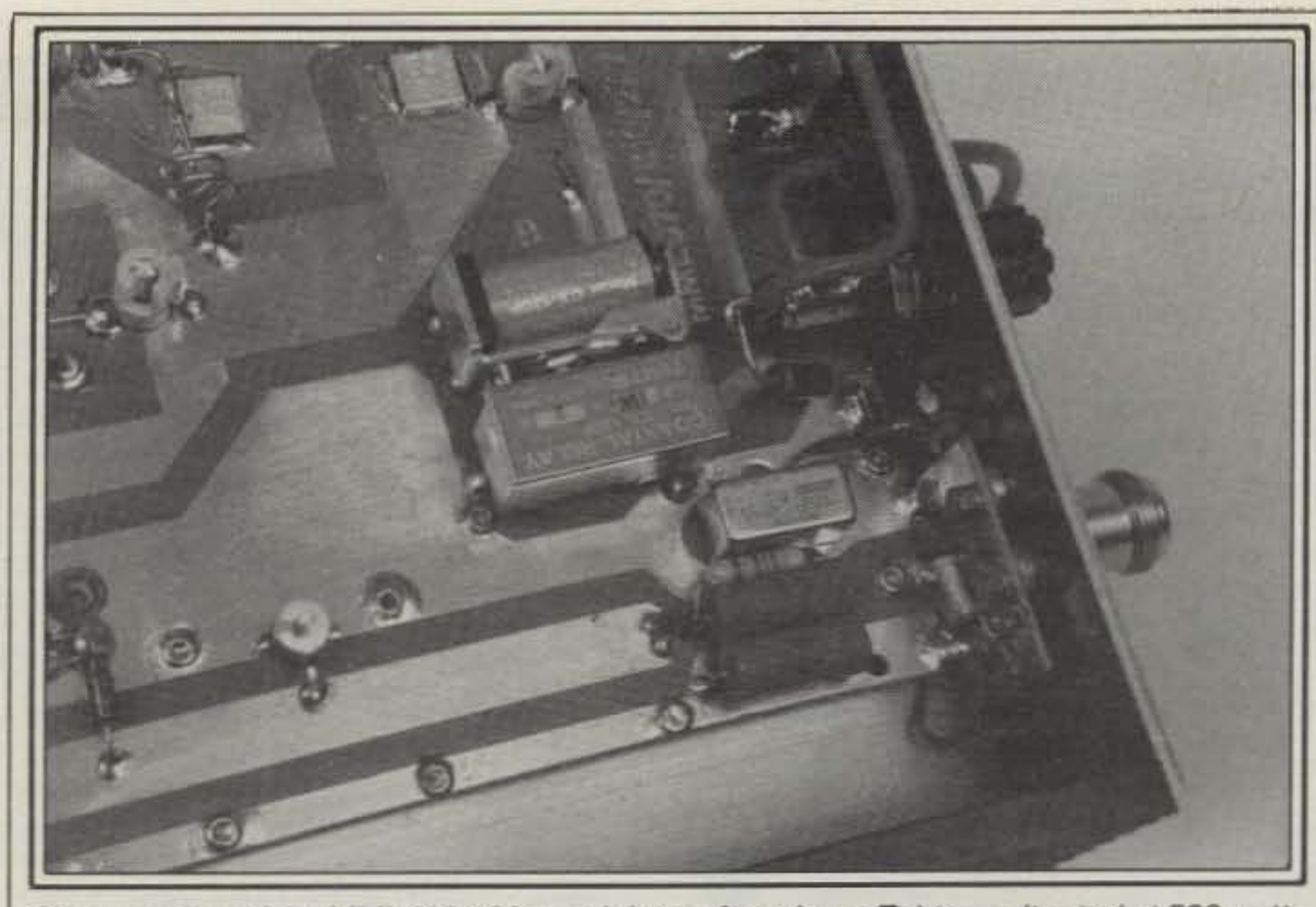
As with most European products, the power **On** switch position is **down**, not up, so don't be confused. There are "power on" and "TX" indicator LEDs, which are self-explanatory, and two more LEDs which indicate "VSWR" and "THERMAL" explanations for possible amplifier shutdown caused by self-protect circuitry. This is a pretty smart amplifier. It will shut itself down and switch to the "bypass" mode for any of the following reasons.

1. High VSWR, if the load VSWR is > 2.5:1.
2. Thermal overheating, if heatsink temperature exceeds 65 degrees Celcius.
3. Overvoltage, if DC voltage applied is > 15 volts.
4. Reverse polarity (DC).

These protection circuits are not simple fuses and zener diodes; they are "smart" circuits which include two IC's, ten discrete transistors, twelve discrete diodes, two relays, and a complement of three dozen passive components. The "High VSWR" circuit, for example, senses load VSWR every 8 seconds once it has been activated; when the load VSWR returns to < 2.5:1, the circuit will return the amplifier to normal operation.



Close-up view of the RF circuitry, showing the 2SC2496 driver stage (right) and dual 2SC2915 output transistors. Each 2SC2915 is rated at 145 watts dissipation!



Close-up view of the MML432/100 coaxial transfer relay, a Tohtsu unit rated at 500 watts intermittant power handling.

Unlike most solid-state power amplifiers that are made for the amateur market, the MML432/100 contains a regulated bias supply (+3.5 volts) for the driver and output transistors' bases. Again, this bias supply is not a simple resistor or zener diode, but is an IC regulator driving a pair of regulator transistors configured as a Darlington amplifier, with the putput transistor thermally bonded to the main amplifier heatsink. Because of such careful attention to detail, the MML432/100 is far more linear than most of its competitor units, and this difference can be heard in SSB (or seen in ATV) service.

The RF lineup is typical of UHF power amplifier designs, with one bipolar NPN power device (a 2SC2496) driving a pair of large NPN devices (2 × 2SC2915) through an etched power divider; the outputs of the two "final" amplifiers are combined in an etched, tuned power combiner and then fed through an etched directional coupler (for VSWR sensing) to an on-board RF transfer relay. Again, unlike many competitive units, the Microwave Modules product uses a real coaxial relay, an excellent Japanese unit found in many more powerful UHF designs.

Since the gain of and leakage currents in bipolar transistors are a function of their junction temperature, it is necessary to bias power devices not only for linear operation at room temperature, but also throughout their operating temperature range. To facilitate this, the MML432/100, like most bipolar power amplifiers, contains silicon diodes which are thermally bonded to the power transistors and connected so as to adjust operating bias to compensate for changes in junction temperature. This is an old trick learned by entry-level engineering students, but it works well.

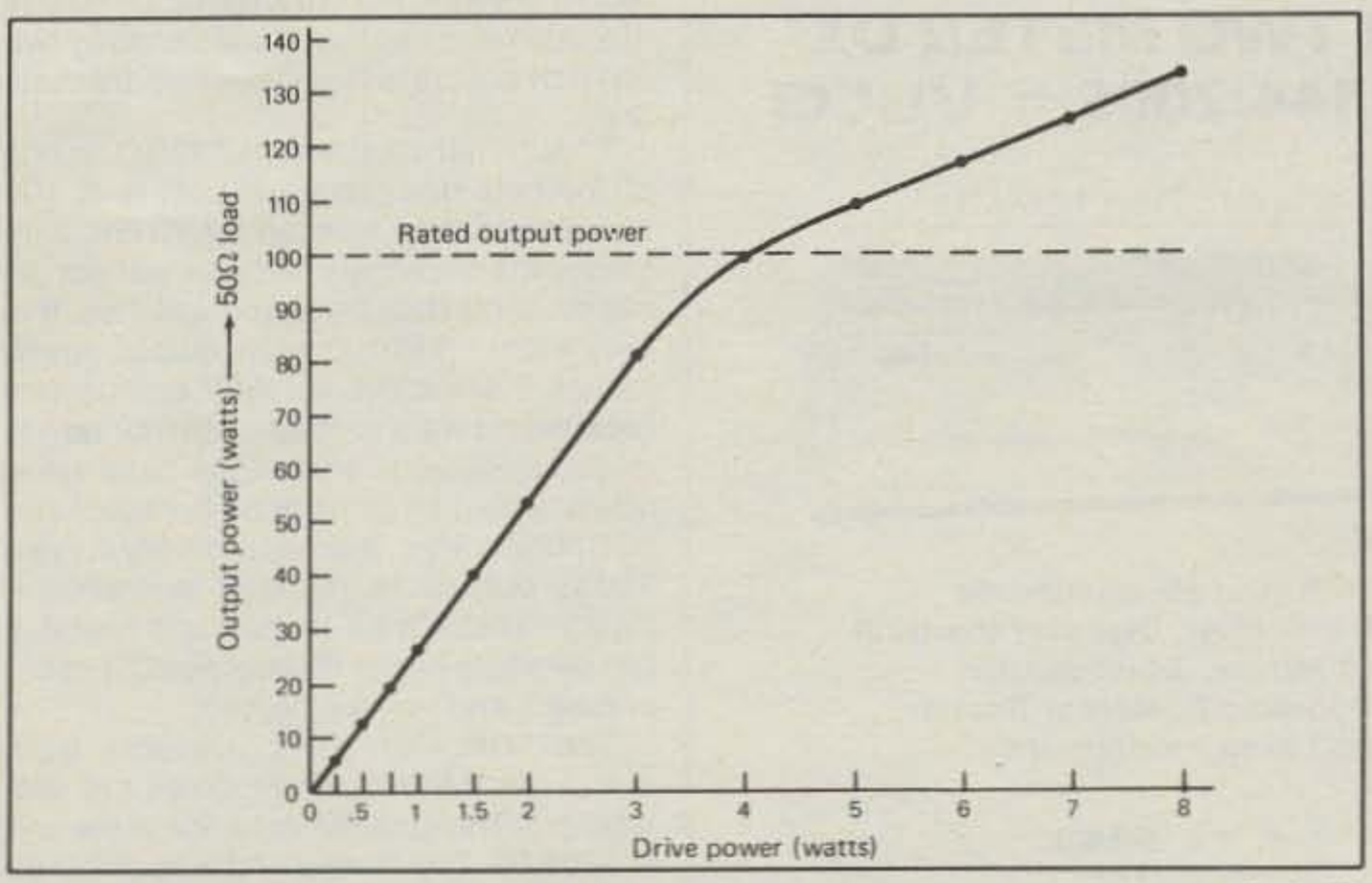
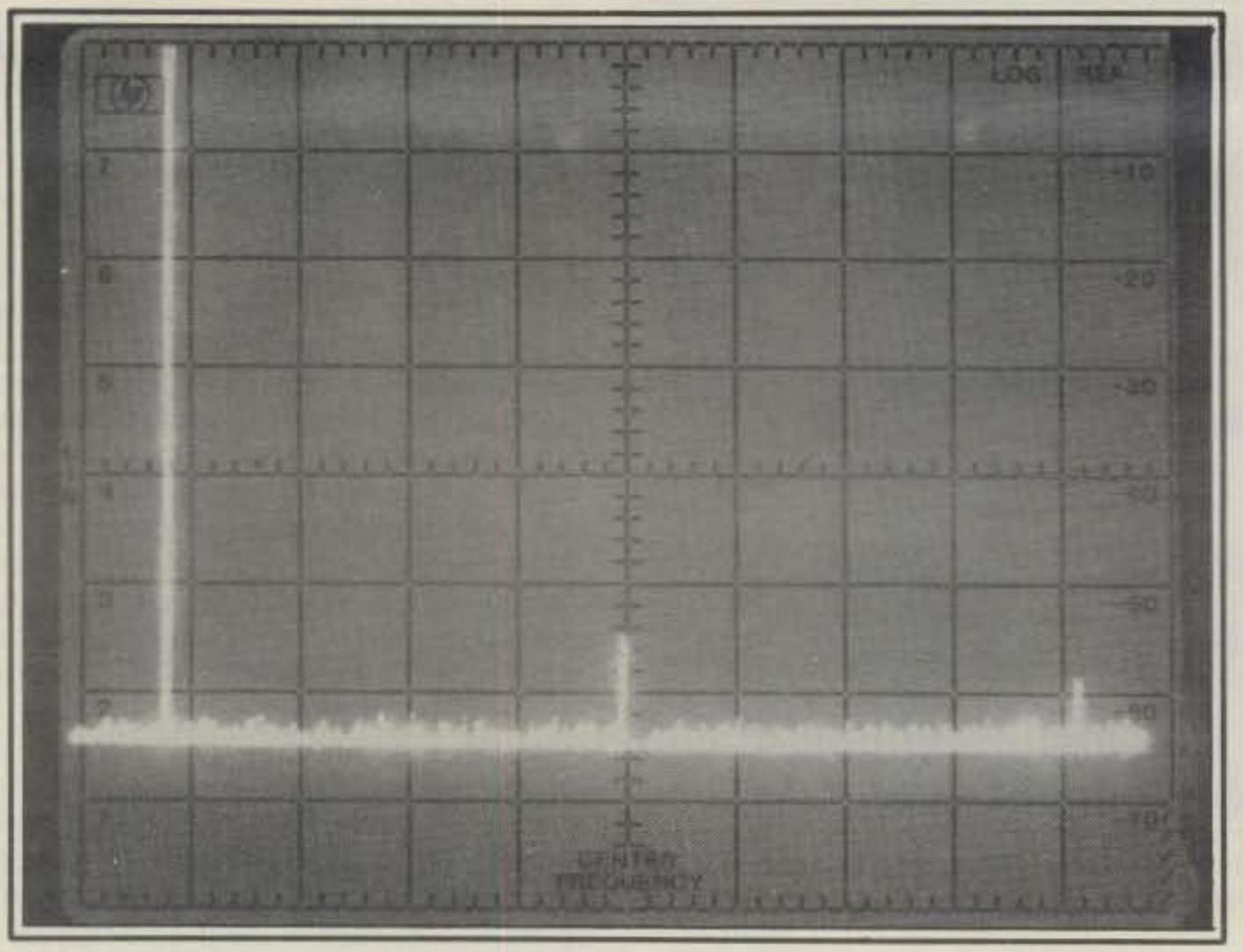


Fig. 1– Linearity curve for the Microwave Modules MML432/100. Unit was supplied with 13.8 VDC. It exhibited an average gain of 14.26 dB at a frequency of 432.0 MHz.

The MML432/100 printed circuit board is made of a Teflon-Fibreglas material which has a lower dielectric constant than standard epoxy-glass boards found in most electronic equipment, and is more stable and controllable than the familiar transluscent green material. This is important when etching tuned RF circuitry at centimeter wave frequencies, for it helps maintain higher "Q" and more predictable results than are obtainable with conventional PCB materials.

Well, how does it work? Darned well, I'd say! The MML432/100 exceeded every published specification, and this was a refreshing bit of good news in an era of "specsmanship" and downright dishonesty in the commercial electronic marketplace. Perhaps the best news of all was that the unit's input VSWR at nearly all power levels is almost too low to measure, certainly < 1.2:1 (compared with 50 ohms). This means that the length of the input cable should not be especially critical, and the exciter unit will be very happy driving the Microwave Modules product. The next good news was that the nominal amplifier power gain, which is rated to be 10 dB (× 10 power gain), measured 14.26 dB average in the linear region. Instead of requiring 10 watts drive power for 100 watts output, the test unit required only 4 watts showing a 13.98 dB power gain. (The 14.26 dB figure was taken at 80 watts output, where only 3 watts drive was required.)

Other good news: At 10 watts drive power, the test unit developed 140 watts output power, showing slight nonlinearity but a good indication nonetheless. The MML432/100 certainly makes its rated 100 watt output power with much room to spare! Surely an amplifier running at more than 2 dB compression (nonlinearity) will generate a filthy spectrum of harmonics and unwanted products, right? Wrong. Even at 140 watts output power, 40% above its rated level, the MML432/100 was spectrally as pure as the driven snow, showing exactly the same output spectrum as at lower power levels (see spectrum analyzer photograph). At all levels, including 140 watts output, the second harmonic was down more than 55 dB and the third harmonic down more than 60 dB, and no other products could be found within 65 dB of the main signal level. The ×2f (second harmonic) product was probably down more than 55 dB, and was raised somewhat by the high noise floor in the photo shown; this is because we were trying to get a very wide sweep of the spectrum (1000 MHz is displayed on the X axis)



Spectrum analyzer display of MML432/100 at 100 watts output. Display was identical at 150 watts out. Vertical axis is 10 dB/div, and horizontal is 100 MHz/div.

and as such had to use a very wide IF bandwidth.

The amplifier's RF VOX sensitivity, the power level at which the RF transfer relay would reliably pull in, was measured to be approximately 1.5 watts. This is "approximate" because of the hysteresis of the VOX circuit, which made for various pull-in and drop-out power over several successive measurements. As I've stated in other product reviews, I do not recommend the use of RF VOX for zero-carrier modes like CW and SSB; it is a nuisance for both operator and listener. The RF VOX in the MML432/100 can be overridden by the simple use of a PTT line applied to its rear-panel phono jack.

All measurements were taken using Bird 43 "Thruline" wattmeters at the amplifier's input and output (changing detector elements as necessary), with the output terminated in a pure 50 ohm resistive load (100 feet of RG58A/U, then a 30 dB microwave power attenuator, then the input attenuator of the H-P spectrum analyzer), with 13.8 VDC applied to the end of the unit's power cable (we didn't measure the cable's voltage drop), and with Hewlett Packard 8554B/8552B/141T spectrum analyzer. The RF exciter in all cases was a Kenwood TS811A transceiver which was previously measured to have ×2f and ×3f (second and third harmonic) content down more than 70 dB at the power levels used.

In all, I'm thrilled with the design and performance of the MML432/100. Using the amplifier during the ARRL January VHF Sweepstakes, I had occasion to exercise the unit at > 50% duty cycle for at least four hour-long periods and had no problems at all. Even with rather harsh use, the thermal shutdown feature had no reason to demonstrate itself, and the VSWR shutdown tripped only once, when I inadvertently switched the amplifier's output to an unused port on a coaxial switch (no load). The manufacturer rates the power consumption as "12.5 V nominal @ 20 amps for 100 W output." I measured current drain at 13.8 volts and found it to be 20 amps; again, I did not measure the power cable's voltage drop, so it is possible that only 12.5 volts were reaching the amplifier. The supplied power cable is several feet long and made of two-conductor vinyl-covered wire, about #10 gauge (the manufacturer doesn't say—I measured the stranded conductor diameter with a caliper and then guessed).

The MML432/100 contains no receive preamplifier and I for one am happy it doesn't. There is no reason to include a receive preamp in a power amplifier and I can think of several good reasons why not to include one, especially at 70 cm. Microwave Modules Ltd.'s lower-frequency power amplifier products do include GaAsFET preamplifiers with proper sequencing to prevent their destruction. To include a high-quality GaAsFET preamp in the MML432/100 would increase its cost considerably without offering many of us any operational advantage; I already have a 70 cm GaAsFET preamp and don't need to cascade them. Plus, as I stated earlier, I use the MML432/100 as a "driver" unit for a larger final amplifier and as such must use outboard (sequenced) coaxial relays anyway. My preamp hangs on one of these relays so that it is isolated by two pairs of contacts from the main transmit line.

To summarize, the MML432/100 is one of the best designed and best built 100 watt amplifiers I've seen for 70 cm. It includes the necessary features without going overboard on bells and whistles. It is very linear up to 100 watts output, which makes it attractive for ATV enthusiasts (who would want to restrict carrier power to about 50 watts so that the peak video power would remain uncompressed) and SSB purists alike. It would probably survive 100% duty-cycle repeater operation if throttled back a bit to maintain heatsink temperature below 65 degrees C. I'm impressed, and you will be, too.

The MML432/100 is available from authorized Microwave Modules Ltd. distributors. The amateur net price of the unit is $385.00. The review unit was obtained from The PX Shack, 52 Stonewyck Drive, Belle Mead, NJ 08505. CQ

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CIRCLE 48 ON READER SERVICE CARD

Here are some tips on how to work the VHF WPX Contest coming up in July. If you haven't already tried this one, join in on the fun!

How To Operate The CQ WW VHF WPX Contest

BY STEVE KATZ*, WB2WIK

The *CQ* VHF WPX Contest should appeal to every type of operator: young and old, Technician and Extra class, QRP and legal-limit, estate owner and apartment dweller, single band and all band, rich and poor, singles and groups, neophyte and seasoned contester. There is something for everyone in this world-wide VHF operating event.

It is our goal to make the VHF WPX the world's most popular VHF/UHF contest, and a reasonable goal it is. VHF operators and contesters from around the world had input in the development of this contest; the participants in the first annual VHF WPX (1985) had input in the format modifications we've made this year. The contest will continue to expand and change to keep up with modern operating trends. We carefully selected the contest weekend in late July, based on historical data that indicated the best chances for 144 MHz *E*-skip and enhanced UHF tropospheric conditions without ruling out the chance of 50 MHz *E*-skip (here in the Northern Hemisphere). The weather this time of year is also predictably warm, allowing for comfortable outdoor portable/hilltop operations.

With eight different categories of entry and literally dozens of beautiful awards to be offered to the winners, how can you *not* at least give the VHF WPX a try? The complete rules for the 1986 World-Wide VHF WPX Contest were printed on page 48 of the April issue of *CQ*, and reprints are available for the asking to anyone who submits a written request. Log and entry sheets are available, as well. Requests should be mailed to *CQ*, 76 N. Broadway, Hicksville, NY 11801, or to S.C.O.R.E., P.O. Box 1161, Denville, NJ 07834. While *CQ* officially sponsors the VHF WPX, the contest's administration has been performed by S.C.O.R.E. and the VHF WPX Contest Committee.

What is required to seriously compete in the VHF WPX? The motivation and willingness to work up a winning score, of course! Unlike the other VHF/UHF contests, the *CQ* VHF WPX does not lump all single-op or multi-op stations into one category, regardless of transmit power or number of bands worked. There are QPR categories for single-operator stations, and there are single and multi-band categories for both single-ops and multi-op groups. There's also a unique "portable" category for those dauntless ops who set up a generator (or battery, or solar, etc.) powered station at a site off the premises of the operator's home QTH. There's even an "FM" category for those who are equipped only for this mode but would like to share in the fun of VHF contesting.

Awards are based on top scores made in each category and each geographical subdivision as defined by the rules. The geographical subdivisions in the U.S. are states; in Canada, provinces; in Europe, countries; in Japan, call areas. As participation increases, the need to further subdivide each territory may be indicated. If so, we're certainly prepared to use grid squares, counties, or whatever seems logical.

The rules as printed in the April issue of *CQ* are quite clear, but further definition of just a few points may be in order:

1. A given station may enter in just **one** category, so please be specific in your intent; otherwise, the Contest Committee will select the category which seems appropriate but may not be your real choice. Use of the official *CQ* log sheets makes category of competition easy to indicate, since all the choices are listed at the top of each sheet.

2. The 1986 VHF WPX Contest requires exchange of grid locator information (not serial numbers as in 1985). The "Maidenhead" grid locator system, which was developed in Europe years ago and has since been adopted by the ARRL for their contests and awards programs, is a popular concept the world over, and most active VHFers are aware of their "grid." However, newcomers to VHF or to contesting may not know their "grid," and as such we shall make a provision for these folks: The exchange of geographic location with enough specificity to allow the contest entrant to determine the grid square shall be sufficient information for the VHF WPX.

3. Stations licensed in a country other than the one in which they are operating (by reciprocal agreement or special authorization) must use the most simplified form of portable prefix. For example, G3FXB operating portable in New York would sign G3FXB/**W2**. Note that this differs from signing G3FXB/ND2 or any other possibly valid assignment. Stations operating within the territorial limits of their own country, however, take on their own prefix, modified by the call area in which they operate. For example, WD2ABC operating portable in Las Vegas would sign WD2ABC/7 and count as a "WD7" prefix. **Any station operating in an area other than the one indicated by his callsign is required to sign portable for this contest.** Within the U.S., this is *not* a Federal requirement—but it is a contest rule, so please comply!

4. FM operation in the VHF WPX is permitted **only for simplex-mode**, single-frequency communications. Any simplex frequency may be used. Repeater output frequencies may be used, provided that no interference is caused to normal repeater operations and that only simplex communications (single-channel, no split-frequency) is used to complete the contest QSO. It is strongly recommended that repeater outputs be used only during periods of repeater inactivity, to avoid the possibility of interference, even if unintentional.

To win this contest, like any other, requires dedication and hard work. The 1985 winners in every category didn't just get on the air for a few hours; they worked at it, usually for the entire weekend. An all-out effort by an individual or group will require complete station setup **before** the contest begins at 0000 UTC on July 19 (this is 8:00 PM EDT, 7:00 PM CDT, 6:00 PM MDT, and 5:00 PM PDT on Friday, July 18 in the U.S. and Canada). Inconvenient? Maybe, but consider our poor fellow operators in the U.K., for whom the contest begins at midnight or

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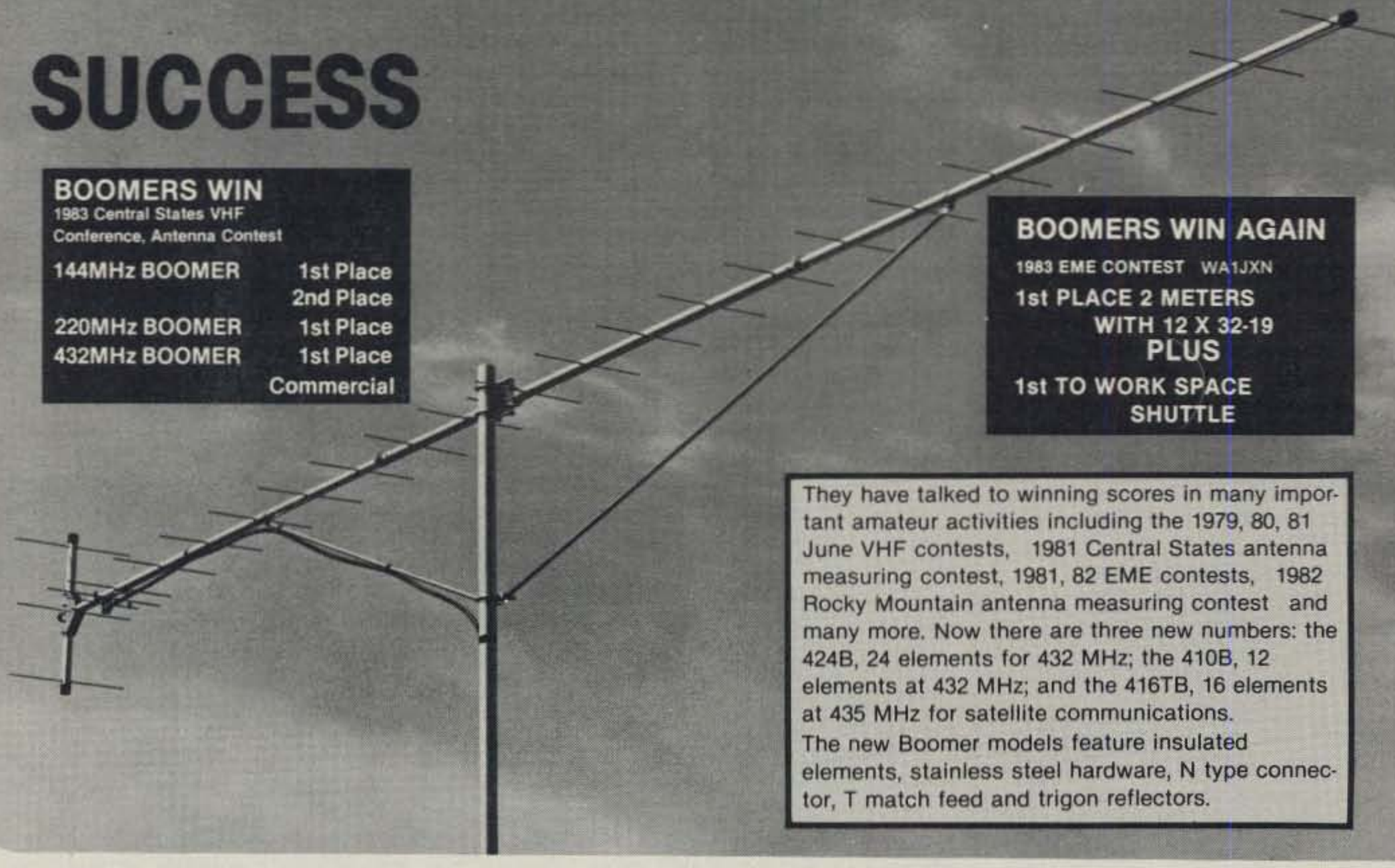

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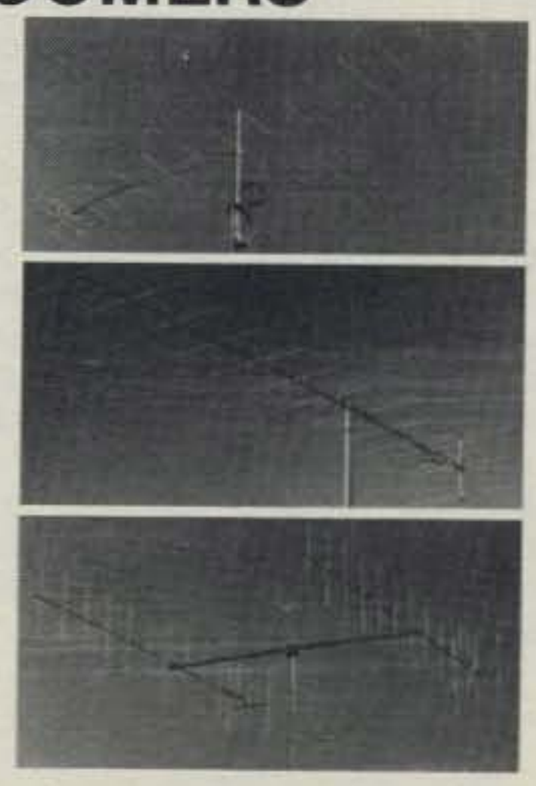

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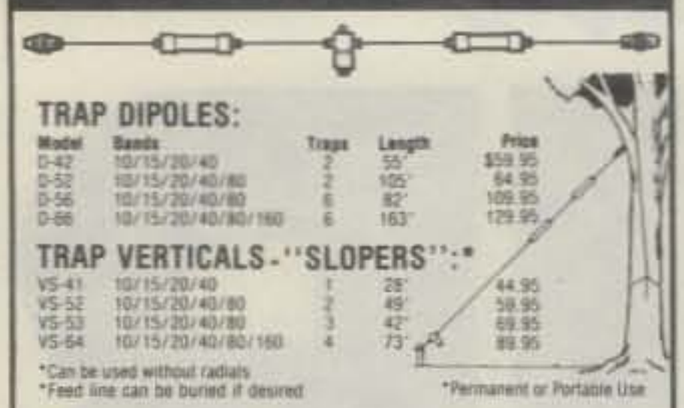

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CIRCLE 12 ON READER SERVICE CARD

1:00 AM! Dedicated HF contesters are used to this schedule, as the popular HF/DX contests all begin at 0000 UTC Saturday.

Don't begin setting up for the contest on Friday afternoon. Start planning *now*! If you need or want to make station improvements, install more antennas, or whatever, now is the time to get to it. Get all the bugs worked out well in advance, so when the contest begins, all you'll need to do is sit down and operate. If you intend a serious (winning) effort, rid yourself of distractions and plan to spend the weekend operating. If you can only devote part of your weekend to the contest, choose your operating hours wisely. This may vary around the world, but here in the U.S. the best hours are from the contest's start to about 2:00 AM local time (not UTC) Saturday, then from 7:00 AM through the day Saturday (depending on band conditions) and up to about 2:00 AM Sunday, then from 7:00 AM through the day Sunday until the contest's end.

If you've very limited time to devote, I'd concentrate on Friday night (local), Saturday midday and afternoon, Saturday night, Sunday midday and afternoon, and Sunday night. Remember that this contest is over at 2400 UTC Sunday, which corresponds to 8:00 PM EDT. Don't get on the bands at 2300 UTC (7:00 PM EDT, for example) with the intention of operating for several hours!

Here in the northeastern U.S., the 1985 VHF WPX produced conditions like this:

0000–0800 UTC Saturday: Excellent tropo on 144 MHz and above.

1000–1300 UTC Saturday: Good 50 MHz meteor scatter.

1500–1800 UTC Saturday: Excellent 50 MHz *E*-skip.

0000–0800 UTC Sunday: Fair to good tropo on 144 MHz and above.

1000–1300 UTC Sunday: Fair 50 MHz meteor scatter.

2200–2400 UTC Sunday: Fair to good tropo on 144 MHz and above.

As you can see, anyone who missed Friday night's terrific tropo or Saturday afternoon's 6 meter *E*-skip session probably didn't do very well competitively. Since VHF/UHF conditions are localized, what happened here may have no bearing whatever on activities elsewhere. Die-hard VHFers will be able to predict with some accuracy when and where to be to maximize their scores (and fun). If you know local VHF weak-signal enthusiasts and can learn from their techniques, by all means, follow them around. Ask questions of local VHF "big guns": When should I operate 6 meters? How about 2 meters? What are the indicators of enhanced band conditions? Will you call me up if the band opens?" (There's nothing wrong with this, for multi-operator stations.)

If you've only limited time to operate and you're equipped for more than one band, use the "VHF activity hour" concept to make the most efficient use of your time on the bands. Activity hour for 220 MHz is 8:00 to 9:00 local time; on 432, it's 9:00 to 10:00 local; and on 1296 MHz it's 10:00 to 11:00 local. These times apply to both AM and PM. We don't know of a 902 MHz activity hour yet, but might suggest 9:45 to 10:00 or 10:00 to 10:15 local until activity builds up on this band. Six and 2 meters are so popular, and the likelihood of *E*-skip is so great in July, that these bands are almost always occupied.

Multi-op/multi-band stations have it relatively "easy," in that they may be able to keep their stations on the air continuously for the duration of the contest. There is no better assurance of catching whatever new stations and multipliers come along with momentarily enhanced band conditions and "spot" openings. But even the multi-ops can miss out if they are too busy drinking beer to notice the band's open. (I must admit that at NV6O/2, our S.C.O.R.E. multi-op station for the 1985 VHF WPX, we spent much time in the swimming pool—and drinking beer—to cool off from the intense July heat. After all, there isn't much point in winning a contest if it isn't also fun.)

Since July is such an ideal time of year for outdoor activities, I'd recommend planning a portable/hilltop operation. There are plenty of hilltops from which to choose. If you can't find a "public" hilltop site where contesting is allowed, try contacting a fellow amateur who happens to have a hilltop residence. Even a mobile setup can achieve a winning score if the mobile location is carefully selected. We know of one amateur who occasionally sets up a portable 2 meter rig at an elevation of 1200 feet in New York City (in the World Trade Center tower). What a splendid contest site that would make!

If you intend a portable operation, the time to set up is Friday morning. Apply *now* for a vacation day on July 18 so you won't be caught in the lurch when the contest comes along. Write it on your calendar. Plan your entire setup: rigs, antennas, towers/masts, rotators, tents, sleeping bags, generator, etc. W1XX had a good article dedicated to this subject in the March 1986 *QST*. Have everything installed and operational a couple of hours before the contest starts. The band could be wide open at 0000 UTC, and you won't want to miss a minute of it. And remember the same thing applies to the very end of the contest: The best conditions of the weekend could come about at 2350 UTC on Sunday, and if you're not there, well .... Personally, I try to plan a day off before and after any contest I intend to win. Not everyone has this luxury, but it sure helps, especially when field setup is involved.

Other than equipment, antennas, and log sheets, what else is a prerequisite for

Say You Saw It In CQ

a successful contest operation? *Dupe-sheets!* Actually, any system used to check for duplicate QSO's during and after the contest is of great help to any but the most casual operator. At our S.C.O.R.E. efforts we use portable, battery-operated computers (usually HP 110's) for dupe-checking purposes, but hand-written "dupe sheets" work just fine. *CQ* does *not* supply dupe sheets, and it is just as well, because a dupe sheet format which includes the entire world would be too cluttered for a VHF contest. Make up your own sheets which include only those areas you expect to work, and then have a separate box titled "DX" for whatever unusual contacts you might find. Here in the W2 area, we lay out our dupe sheets with U.S. call areas in a vertical column down the left side of the page and the letters of the alphabet in a row across the top. We leave lots of room for W1-W2-W3-W4-W8, less room for W5-W9-W0, and even less room for W6-W7 and DX. Your own dupe sheets should be designed to your needs. But don't run the contest without some form of dupe checking, or you'll waste a lot of time working stations over again and your log will contain so many errors that your total score will suffer when our VHF WPX Contest Committee members finish checking it.

Since the multipliers in the VHF WPX are **prefixes**, it pays to have an exotic prefix if you can arrange it. The best equipped and best operated stations will win any contest, including this one, but having a rare prefix will certainly make you more popular, increasing both your score and your fun. The easiest way to operate using a rare prefix is to have one yourself, but the next easiest way is to know someone who has a unique prefix and get him or her to operate with you. If you wish to remain single-op but use someone else's callsign, this is perfectly legal if: (1) You operate from their licensed station location, or (2) You operate portable from an unlicensed location with the express permission of the licensee. In all cases. **you must operate within the legal limits of your own operator's license.**

Another way to have a unique prefix is to operate portable from a call area in which your particular (letter) prefix has not yet been assigned. For example, NV6O/2 was ideal for our group in the 1985 VHF WPX because at that time the NV2 prefix had not yet been assigned; thus, we were the only "NV2" prefix on the air. Those living near a call-area border should take advantage of this, especially if a portable operation is planned.

It is important to remember that PX (prefix) multipliers are not much different from QRA multipliers for VHF purposes. The opportunities for working more prefixes become dramatically improved when the band opens. Several entrants in the 1985 VHF WPX commented that the number of PX's worked approximated the number of grid squares generally worked in a VHF contest from their locations. This isn't surprising. Still, a WPX contest winner may have achieved his goal using entirely different strategies than he would have used for a different VHF contest. Here in the W2 call area, a single grid square is large enough to cover portions of three states. You might have to work out 40 miles or more to reach the next grid. Yet within that single grid lie dozens of possible PX multipliers. Densely populated grid FN20, for example, includes both the W2 and W3 call areas. Within this one grid, the following prefixes are possible:

AA2, AB2, AC2. . .AL2	AA3, AB3, AC3. . .AL3
K2	K3
KA2, KB2, KC2. . .KZ2	KA3, KB3, KC3. . .KZ3
N2	N3
NA2, NB2, NC2. . .NZ2	NA3, NB3, NC3. . .NZ3
W2	W3
WA2, WB2, WC2. . .WZ2	WA3, WB3, WC3. . .WZ3

This totals 186 possible prefixes within one grid square! Of course, not all of these have been issued (yet). Some may never be issued, but it's still a lot of prefixes.

You will find it handy to have a "PX check-off list" of some sort to keep track of multipliers worked. This will allow you to make a running tabulation of your contest score, and will alert you to multiplier opportunities about which you would not otherwise be aware. For example, an hour before the end of the VHF WPX you might look down your "PX's worked" list and find that you had nary a QSO with a KD9, even though your buddy KD9XX lives across town. At this point you could call him on the telephone to request a sked on 146 MHz FM (or whatever) and land yourself an easy multiplier. Without the check list you might not realize you had no KD9 multiplier until the contest was over.

You might ask why we've even bothered with a grid-square exchange for the VHF WPX Contest, when the grid is not part of the scoring system. The answer is simple: Many VHFers are participating in awards programs which use grids, so they want to know; plus, for DX contacts, the locator grid is precise enough for beam-heading information. And the most important reason of all: You asked for them. At least 50% of the 1985 VHF WPX entrants requested the exchange include grid squares.

Well, hopefully this article has enticed you to work the 1986 VHF WPX Contest, or to try harder if you were already planning to work the contest. It's really neat that the VHF WPX gives us North Americans the chance to compete with other VHFers all over the world. The results can be surprising! As hard as we worked at NV6O/2 in the 1985 VHF WPX, we were absolutely "blown away" by a couple of multi-op groups in Europe who concentrated on 144 MHz exclusively. We found Japanese logs showing 3 watt stations on 23 cm who made more than 50 QSO's, and a European entrant who won the "portable" category by operating on just 70 cm. We had more participation from the midwestern U.S. than some of the long-running ARRL contests have shown, and from the comments of the entrants, everyone had a really good time.

Get out in the sun and spend the third weekend in July working the *CQ* World-Wide VHF WPX Contest! Make it a picnic or a party, hike to your favorite mountaintop, or lock yourself in an air-conditioned room at home. Whatever you do, try this contest for size and you'll like how it fits. And good luck! CQ

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This sounds like one of the more enviable DXpeditions. I'm sure it wouldn't be hard to talk us into going along with Mike on his next trip.

It's Better in C6A-Land

BY MIKE CRISLER*, N4IFD/C6A

Imagine the ideal vacation setting: warm tropical breezes, calm cobalt-blue water, deserted white sand beaches, fleecy-white clouds in a crystal clear sky, and the tropical sun gleaming off the elements of your beam antennas! For the avid ham radio operator this certainly sounds like the beginning of a dream.

I read an article in *CQ* last year about a Mini-DXpedition to the Bahama Islands (C6). I began to think about trying it myself during a vacation I was planning to those jewels of the Caribbean last summer. The only difference in my plan was that I intended to do my operating from C6 through the amateur satellite OSCAR-10. To my knowledge there had only been a few stations on the "bird" from C6-land. I reviewed what I would need for successful satellite operation from a remote location. I then became even more excited about the possibilities after realizing that in a couple of airplane baggage-size boxes I could carry a state-of-the art, no compromises, OSCAR-10 station. I knew rare DX and hours of pleasant rag-chewing were "just across the stream."

I am fortunate to be a partner in a sportfishing boat. Several of us own this boat with the express intent of chartering it to groups of fisherman or scuba divers to help it pay for itself. The best part of this arrangement is that when it's not chartered I can use it. My plan for this DXpedition was to operate "marine mobile" with the antennas on a simple tripod on the foredeck (bow) of my boat. The equipment I planned to use would work just as well on the beach next to a room in one of the many semi-private resorts that abound in the Bahamas. Our usual practice is to put our boat on the *Poseidon* in Nassau early in the summer and leave it there until late fall. I didn't have the foresight to put any of the gear I would need onboard before the boat left Miami. Instead I had to box it all up and transport it as luggage. Since the antennas for OSCAR-10 are small, light, and don't need to be very high to function superbly, carrying an entire station as checked baggage was not a problem.

Before any ham even seriously considers a DXpedition, the first order of business is the reciprocal license. Fortunately, as I have been cruising the Bahamas for several years, I already had my /C6A. A Bahamian reciprocal license is very easy to get if you just give the Bahamians a little time to process the paper. Send $6.00 and a copy of your license to O.A. Johnson, c/o Batelco, P.O. Box N3048, Nassau, Bahamas. There was only one more problem I didn't anticipate. Dealing with the Customs officials in Nassau brought an unexpected surprise: I had to leave a large deposit on the gear I took into the country ($500.00) to guarantee that I wouldn't sell it while I was there. If you are prepared for glitches such as these, everything else will be fine business.

The Poseidon anchored off of Rose Island in the Bahamas. Note the antennas on the foredeck. If you look closely, the preamplifier is visible on the back of the larger antenna.

For those of you who may not be familiar with the simplicity of a current satellite station, let me explain the gear I used during this trip. This is the same gear I used back in the shack, at Field Day, and whenever I do an OSCAR-10 demonstration at a hamfest, etc. The antennas are small by any standard, especially when you consider they are capable of predictable, repeatable intercontinental DX on a daily basis whenever the satellite OSCAR-10 is in view. On a typical day this satellite will be in view of a ham in this part of the world for about 8 hours. For about half that time the bird's apparent motion is so small that the direction of the antennas can be left unchanged! This was the operating window I chose, since I didn't want to carry the antenna rotation system along on this trip. However, I did have a run from my Commodore-64 telling me where to point my antennas (both azimuth and elevation). I would look at the boat's compass and point my antennas accordingly, guessing at the exact position. OSCAR antennas have sufficiently wide beamwidths so this is not a problem. As you can see in the photo, I had the antennas on the foredeck of the boat. Even the slight rocking of the boat at anchor didn't seem to affect my ability to send a good signal up to the satellite.

OSCAR-10 works something like a repeater 22,000 miles up in space. Your input or "uplink" to the satellite is around 435 MHz and the satellite's output or "downlink" is around 145 MHz. However, there are a few differences from repeater operation. QSOs are either in sideband or CW and up to 100 of them can be occurring at once! The use of two separate bands allows full duplex operation so you can simultaneously monitor the downlink and thus tell how your uplink signal is making the trip. Hopefully, this explains why you see two antennas and two rigs in the photos.

The rigs I chose for this trip were the Kenwood 711A/811A pair. My local distributor had given me the opportunity to evaluate these rigs, and I found them excellent for use on OSCAR as well as any other type of VHF/UHF activity. These rigs offered some unique features that helped make this trip a real pleasure. Both the 711A and 811A come stock with the option of using 120 VAC or 12 VDC. This is a first-class feature, which allowed me a choice to power the rigs without having to carry along an extra, usually heavy, power supply. As an added plus, both rigs are compact in comparison to other similar gear, but they certainly are not "small" on features. As they both put out 25 watts of RF, I had no trouble getting into the satellite with the antennas I chose for this trip. In fact, my signal reports were usually excellent! As far as reception goes, these were certainly up to the standard usually set by Kenwood. In short, I was very pleased with these rigs; they work great as an OSCAR-10 ground station.

The antennas I used were the KLM 14C and 18C. These are probably the "standard" OSCAR-10 antennas. They are lightweight, mechanically very substantial, easy to assemble and dissemble, *and* are excellent performers for satellite communication. Although these antennas offer the ability to switch the sense of their circular polarization, that feature is only rarely necessary and was not used on this trip.

**8341 SW 137th Ave., Miami, FL 33183. Mike is an AMSAT Area Coordinator and tries to help amateurs in his area with satellite operation. For more information about OSCAR operation and the name of your Area Coordinator, contact the organization behind it all: AMSAT, P.O. Box 27, Washington, DC 20044.*

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The "operating position" inside the salon of the Poseidon. The rigs used were the Kenwood 711A and 811A. Look closely and the concept of "full duplex" is illustrated; the bottom rig is the uplink (note the mic), and the top rig is the downlink (note the headphones).

A word of explanation is probably in order here. Just as a rifle bullet spins to give it stability, so does a satellite. Unfortunately, this spin also does strange things to the wavefronts propagating away from the antennas on the satellite. We say these waves are "circularly polarized." All this means to us on the ground is that we need a similar circularly polarized antenna to effectively communicate with such a satellite. The antennas you see in the photos achieve this circular polarization by placing two Yagis on a common boom. Each Yagi is rotated 90 degrees to the other and one is fed one-quarter wavelength out of phase. Such antennas are excellent for both FM and SSB/CW work on VHF/UHF since they have both vertical and horizontal components in their wave patterns!

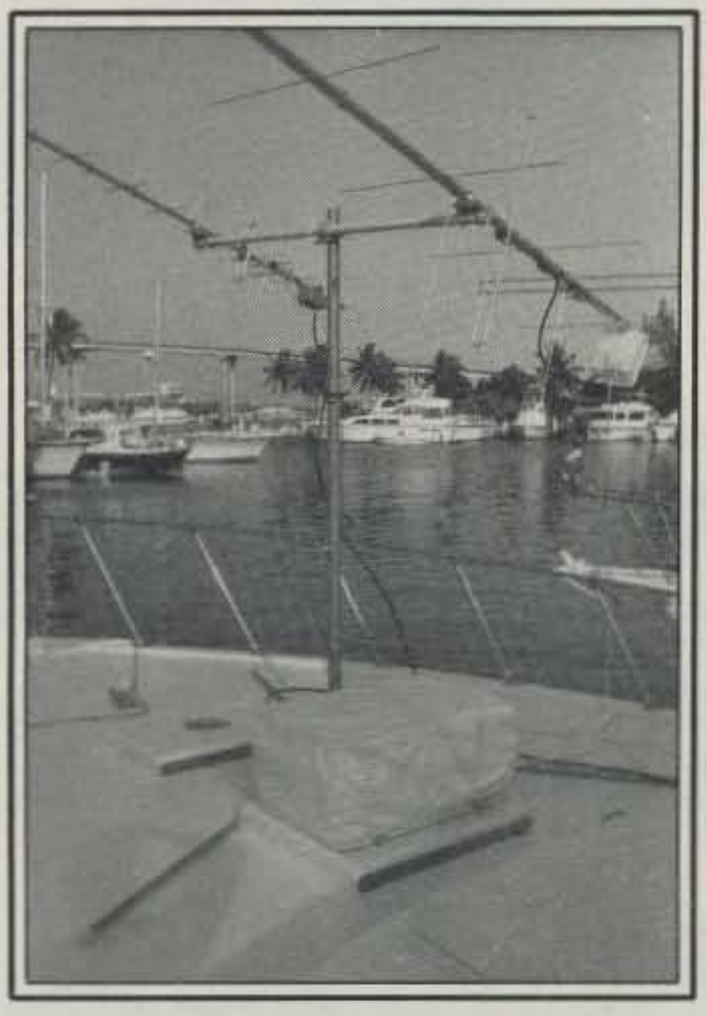
These antennas were attached to a fiberglass crossboom which was attached to my "mast" with a right-angle scaffolding clamp. My tower was nothing more than a 7 foot piece of inch-and-a-quarter pipe screwed into a floor flange to which I had clamped three 6 foot lengths of ¾ inch pipe. This way I could get to everything to hook it up and point it toward the sky. The key to this is the fiberglass boom. Since we have gone to such trouble to get a circular polarized antenna it would be a real waste to place a metallic object in that field to distort it. The fiberglass boom prevents that. Wood closet rod dowels work just as well.

You now might ask the obvious question: "How can an antenna system this small and only 7 feet off the ground (deck) be effective?" Therein lies the real beauty of communication through OSCAR-10. Since the bird is usually up almost 20,000 miles, why would a few feet of height at the antenna matter? Well, it doesn't. Many of my amateur friends back in Miami, where most of the neighborhoods have *severe* antenna restrictions, have a very similar system sitting in their backyard or carport and simply raise it or roll it out when the urge to talk to someone far away bites them.

Last, but not least when selecting gear for an OSCAR station is the preamplifier. This is the *most* important piece of equipment in any satellite station. OSCAR-10, the satellite itself, is small. It would easily fit on a desk top. Consequently, its output power is limited to about 4 watts EIRP per user and that's sometimes more than 20,000 miles away. A high-gain/low-noise preamplifier helps make up for this inherently weak signal. The signal level is typically close to the noise floor of your receiver. Therefore, the minimum noise figure of the preamp is more important than its maximum gain. Fortunately for us, recent advances in GasFET transistor technology have made high-gain but extremely low-noise figure preamps readily available. An important thing to remember is to inadevertently avoid adding to the noise figure of the preamp during installation. This simply means putting the preamp as close to the feedpoint of the receiving antenna as possible. You will notice in the photo that my preamp is hanging off the back of the antenna in a Tupperware box.

The station as described above performed magnificently. It was a real thrill to be the subject of a pile-up and not merely one of the many trying to work a rare station. I worked approximately 130 stations in 5 days using it only about 2 hours a day. (I did want to spend some of my vacation time with my family Hi-Hi.) Even though there were pileups, all the conversations were refreshingly complete and not of the usual contest format. In fact, some of them became roundtables about satellite topics. Imagine a roundtable QSO with a European station, a South African station, some stations from South America, and the west coast of the US! OSCAR "sees" almost half the word at once, so such QSOs are commonplace.

I have seldom enjoyed ham radio or anything as much as that mini-DXpedition. I am already planning to do it again this summer. If you want to work C6 on the bird I'll be there in the first two weeks of July! Hope to work you then.



A complete OSCAR-10 antenna system. The smaller antenna is a KLM 18C—the uplink or transmitting antenna. The large one is the KLM 14C—the downlink or receiving antenna. Note the plastic box at the end of this boom which contains the preamplifier. The details of the non-metallic crossboom and the supporting "tower" are also visible.

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How To Build A 2 Meter Oscar 10 Antenna

BY RUDOLPH E. SIX*, KA8OBL

Amateurs working Oscar 10 know the receive-end is the weak part of the system. A good set of 2 meter antennas goes a long way towards enjoying the bird and receiving that rare but often weak DX station.

I decided to build my own antenna using Yagi dimensions optimized by the National Bureau of Standards. These antennas were originally described in NBS Technical Note 688 (available from NBS, Technical Information and Publication Division, Washington, DC 20234, order no. 262885 for $8.50). Several articles have been written using the NBS data, notably "Go for the Gain, NBS Style," W1LJ, *QST*, August 1982, and "How to Design Yagi Antennas," W1JR, *Ham Radio*, August 1977, both excellent articles. I am making it simpler yet by including the dimensions for a 146 MHz, 17-element, 3.2-wavelength Oscar 10 antenna. A 3.2 wavelength antenna is approximately 22 feet long, and since two are required for circular polarization, not much time is lost before reality dawns on the average UHFer that this is big. And—hold it—they have to be turned in azimuth and elevation. So we cast an eye up onto our average TV tower and we know we don't stand a prayer.

Well, that was the situation with which I was faced. I have a crank-up, but it is not designed for heavy loads. The only solution was to go lightweight. First I decided to use fibreglass for the boom. Obviously, because it is light, but it is also nonconductive: it does not present a virtual ground to the antenna next to it. Two antennas can be placed closer to each other without mutual interference.

Each antenna was constructed from two fibreglass poles, one 14 feet long with an O.D. of 1.57 inches and an I.D. of 1.4 inches and an 8 foot long pole with an O.D. of 1.25 inches and an I.D. of 1.1 inches. These fibreglass poles were purchased from Sky-Pole Manufacturing Inc. (1922 Placentio Ave., Costa Mesa, CA 92627) and are listed as Item 61, 8 feet long, and vaulting pole 14 feet long. All the elements except the driven element are 3/16 inch rigid aluminum tubing, and the driven element is 5/16 inch rigid copper tubing. Note in fig. 2 the T-Match used with the coaxial ½-wavelength phasing line. The coax is Teflon RG-188. The center conductors are soldered to the matching stubs, and the shields are soldered to a small copper plate held by the ceramic spacers to the bakelite mount. Teflon is ideal because it does not deform or melt with solder temperatures. The mounting plate is attached to the boom with epoxy glue.

The coax feed is terminated with a TNC

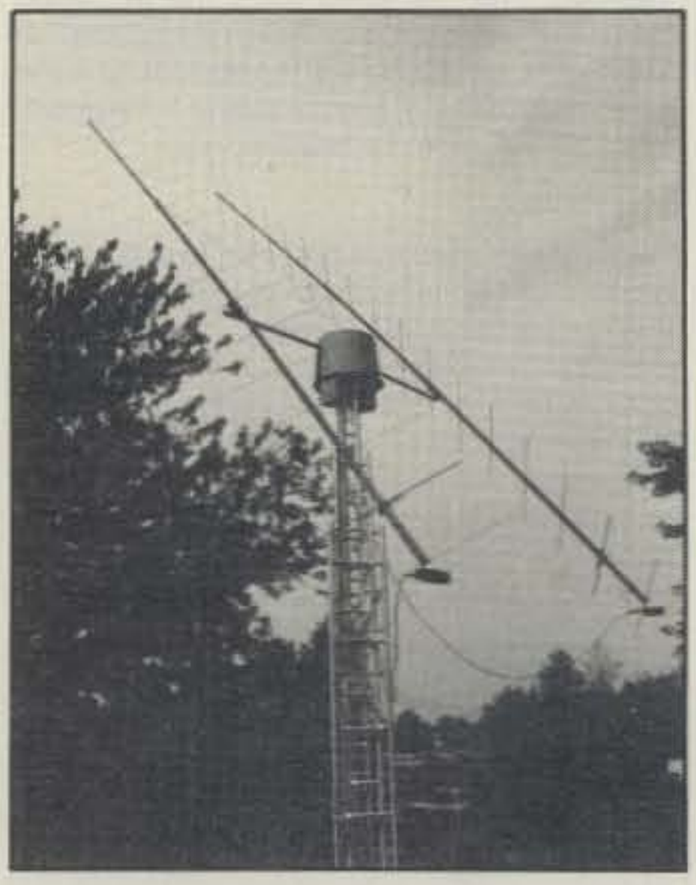
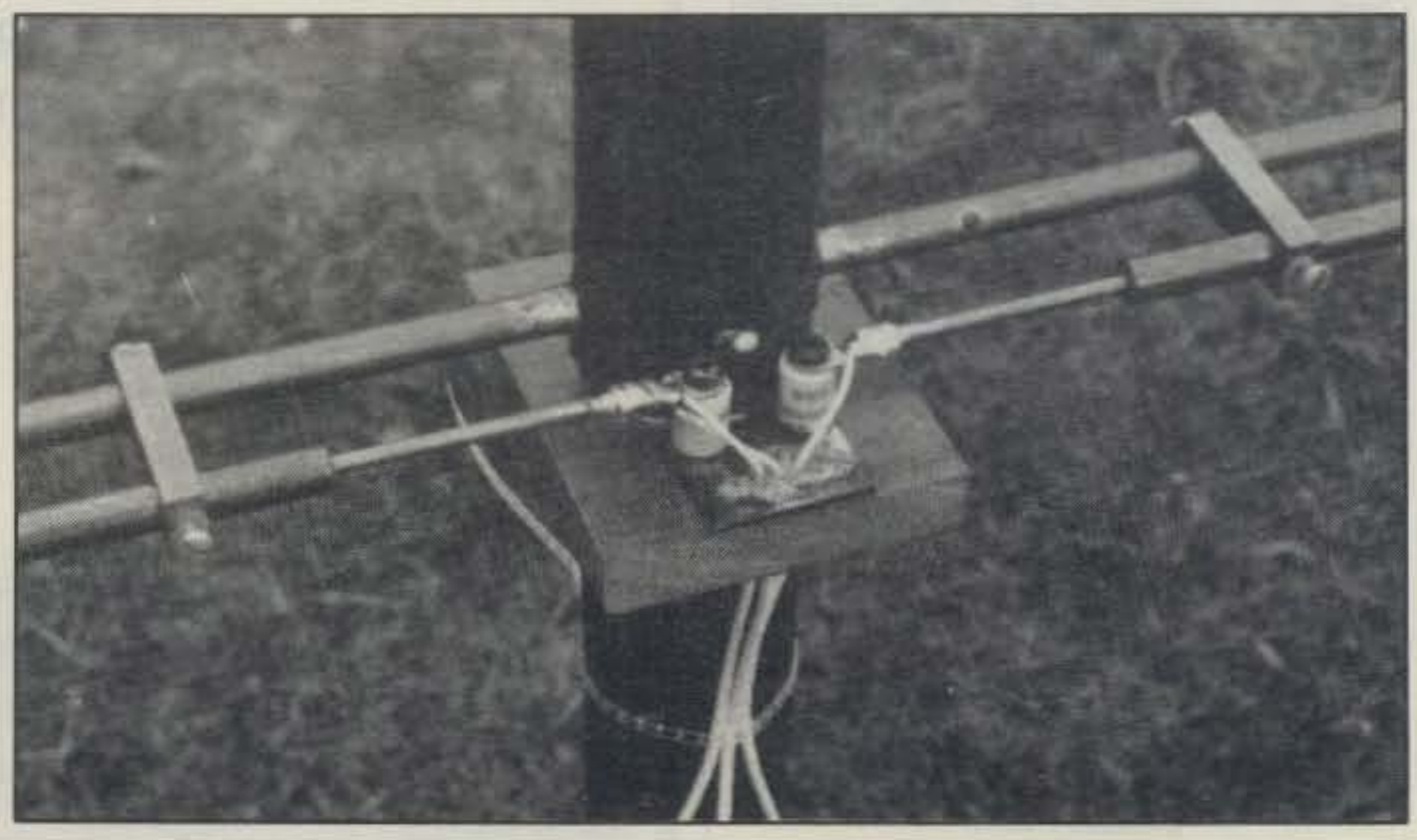


Fig. 1– Complete antenna. Distance between the booms is 6 feet. Note coax falling away from reflector.

Fig. 2– T-match. Coax is soldered to ring lug which holds the center rod.



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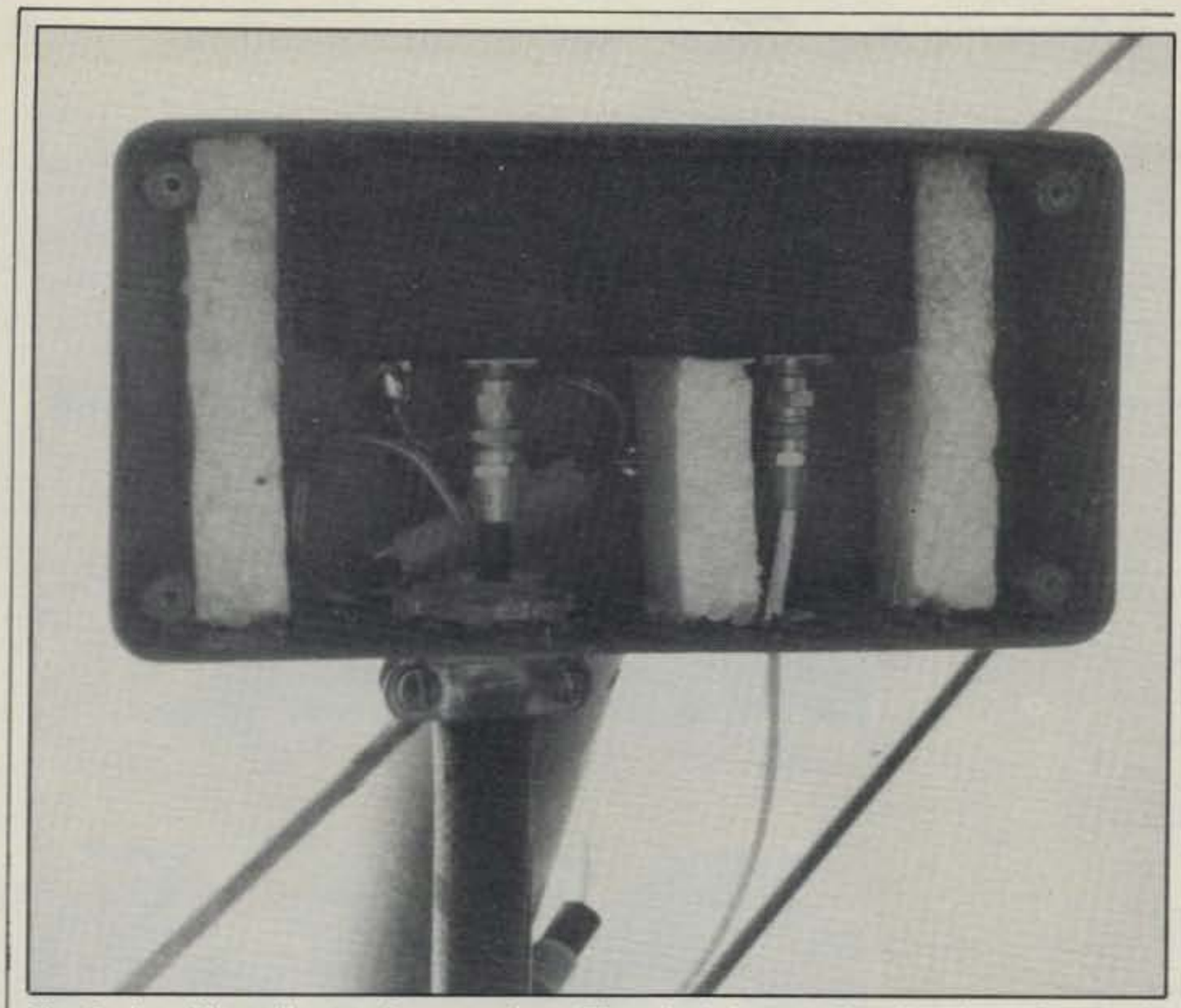

Fig. 3–Amplifier with styrofoam wedges. Electrical clamp with rubber hose is a strain relief for the RG-58 coax.

connector and runs to a small box (Radio Shack 270-223), containing the GAsFET amplifier, mounted behind the reflector at the end of the boom. Fig. 3 shows the amplifier purchased from Microwave Components (11216 Cape Cod, Taylor, MI 48180). (Specify TNC connectors when purchasing.) TNC fittings were selected because of small size and low UHF losses. They make a solid and sealed connection unlike a BNC connector, which has a nasty habit of becoming intermittent. Lightweight foam insulation is used to hold the unit in place, and the inverted mounting keeps water out of the amplifier. The output cable is RG-58.

When I installed the antennas, both amplifiers were promptly wiped out by a lightning storm. Both GAsFETs were replaced by Norman Alred, owner of Micro-

Fig. 4–A simple wooden cradle steadies the antenna during high winds—and also out of the power-line feed.

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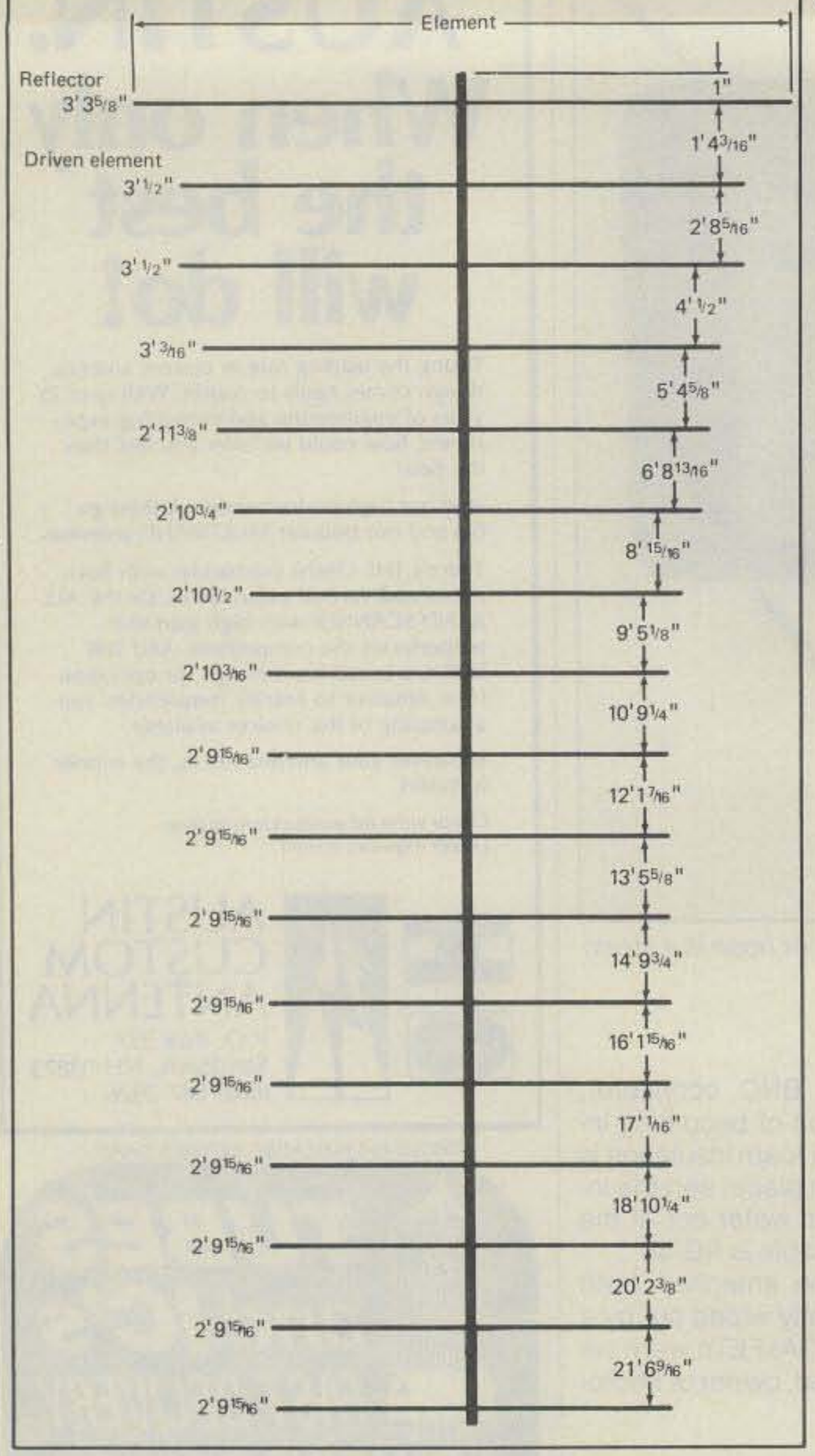

Fig. 5– The dimensions and spacing of elements.

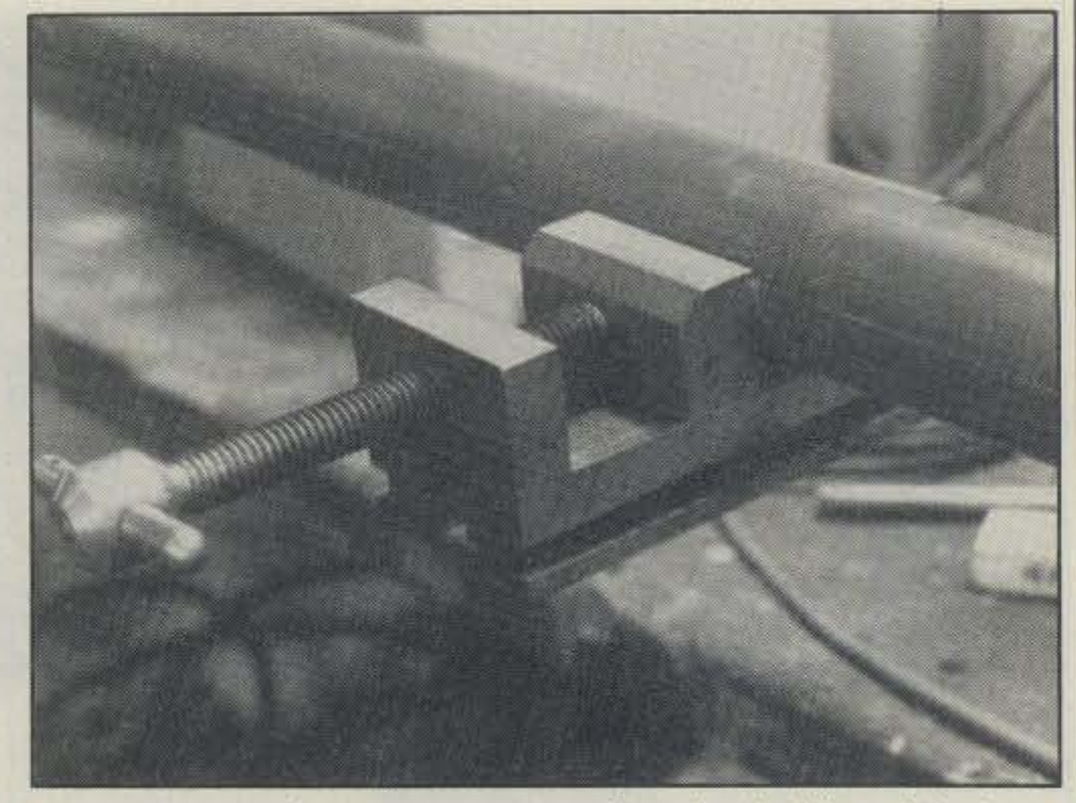

Fig. 6– How to make an accurate mark on both sides of the boom.

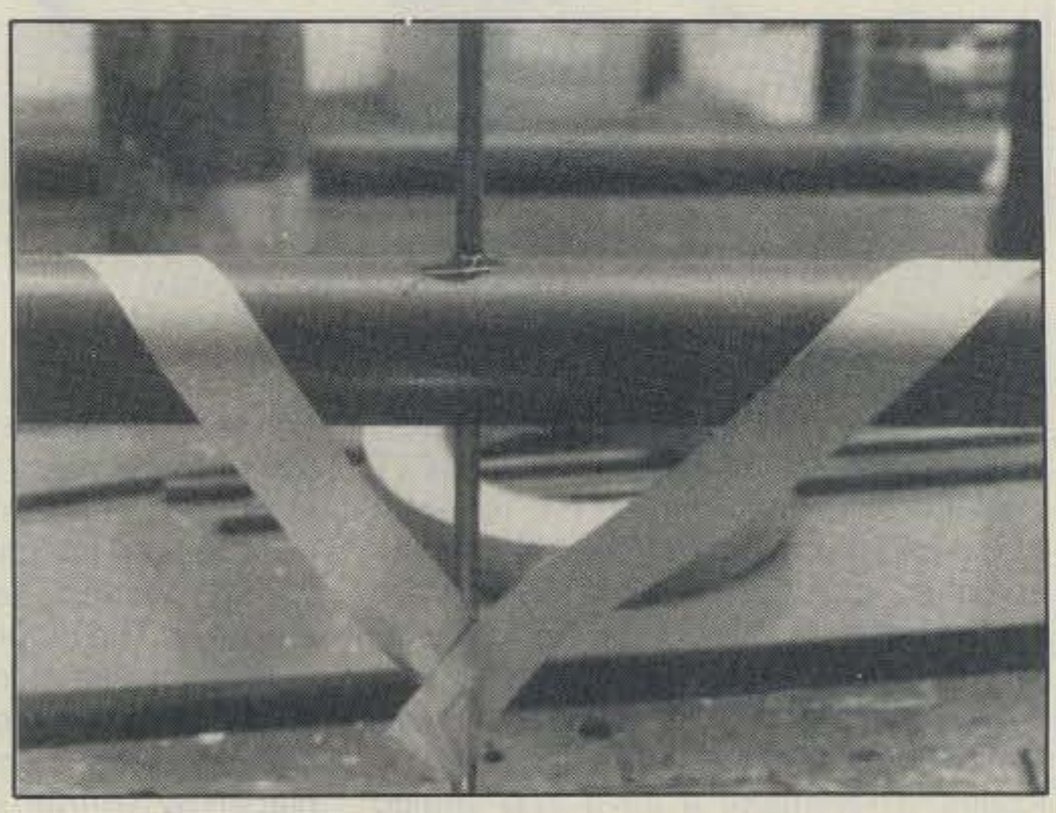

Fig. 7– Installing the elements with epoxy first.

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wave Components (see *CQ* October 1985 VHF column). To prevent further trouble a small relay (Radio Shack 275-241) was installed in the amplifier. The n.c. contact keeps a short at the input when power is removed. Lightning has not been a problem since. Norman will build the amplifier with the relay installed. He can also supply the TNC connectors and teflon coax.

As fig. 1 shows, there is little droop of the boom. The cross boom is plastic water pipe with hickory broomsticks as internal stiffeners. The guy wires in the form of an X observed above the cross boom are industrial plastic packing strap, ½ inch wide, and they keep the booms parallel. The rotors were homemade from 1 RPM surplus motors and covered by a plastic garbage can. The can was convenient, although a bit large.

It is usually true that lightweight materials are also more flexible, and this is the case with fibreglass. It does flex, and when horizontal it can store up quite a bit

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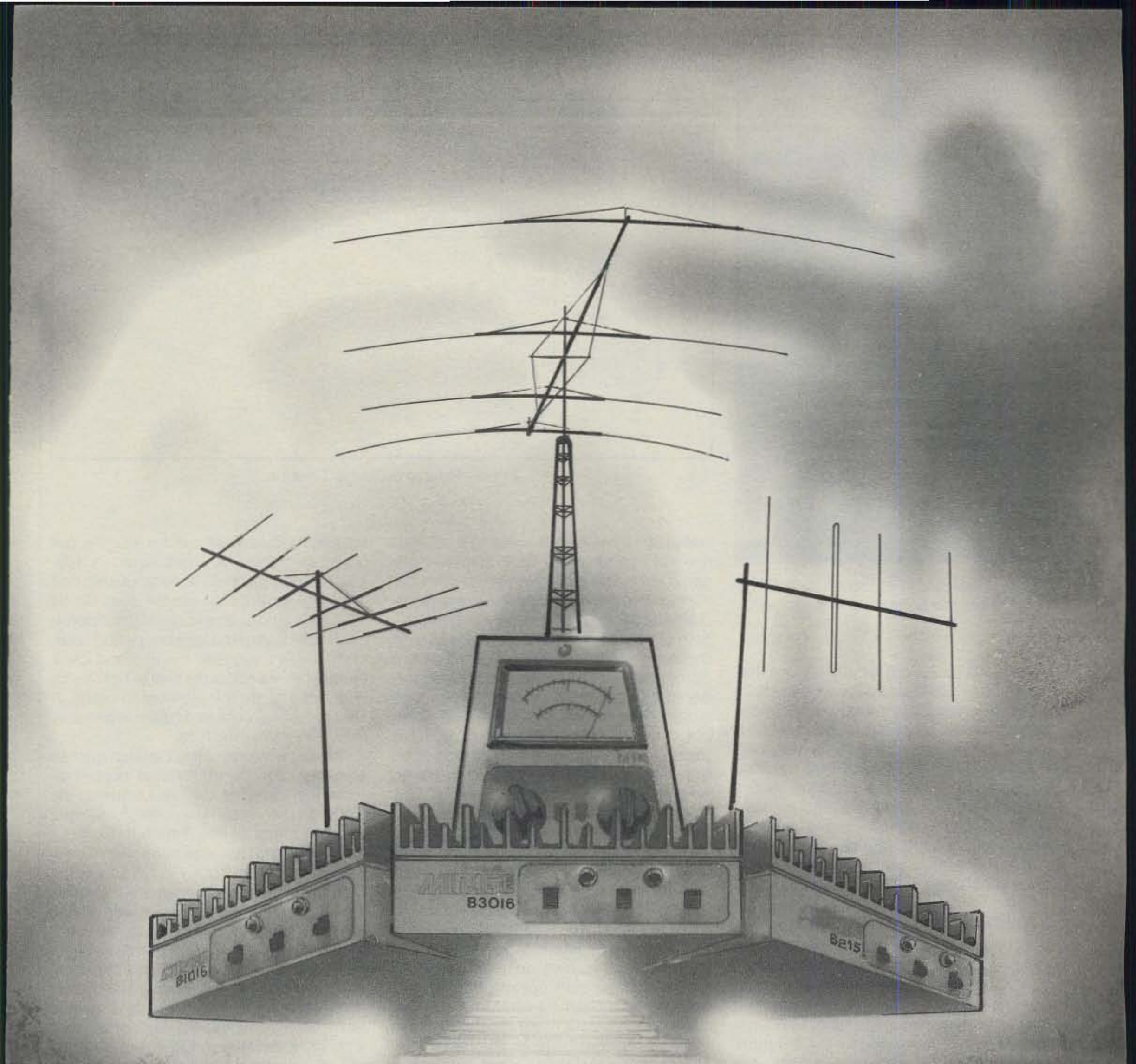

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Fig. 8– A final squirt of foam insulation. It also made the boom 100% draft free.

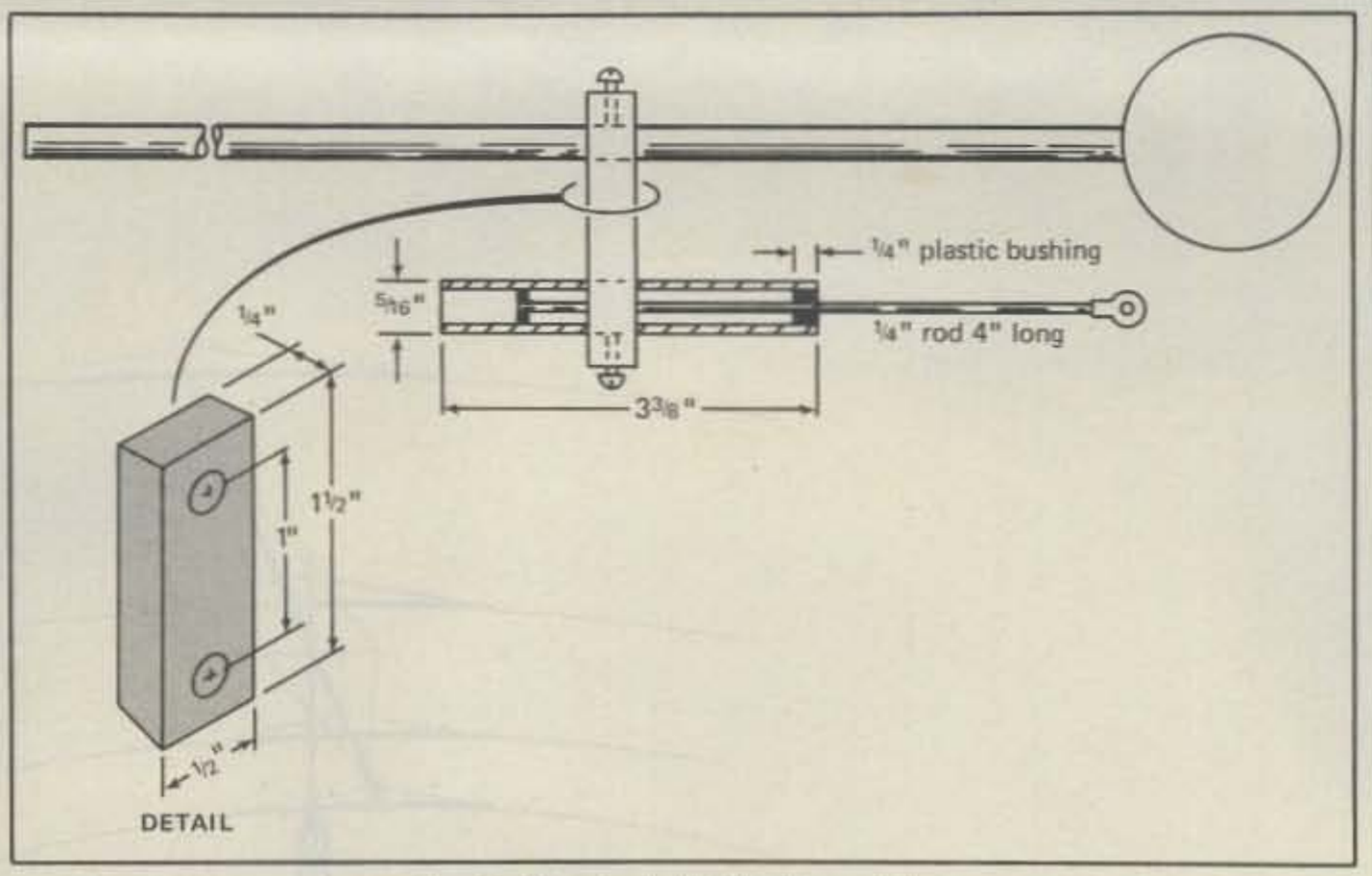


Fig. 9– How to build the T-match.

of inertia in its 22 foot length. I found that the antenna could stand the worst weather if stored vertically with the front of the antenna down, since it is longer. I made a cradle (fig. 4) from plywood for very bad weather and to keep the antenna from the power lines. I tied the antenna to the cradle with rope when we had tornado weather with 60 mph winds this summer. An advantage with satellite operation is that the height is not important. Just a clear view, usually 20 feet, is adequate.

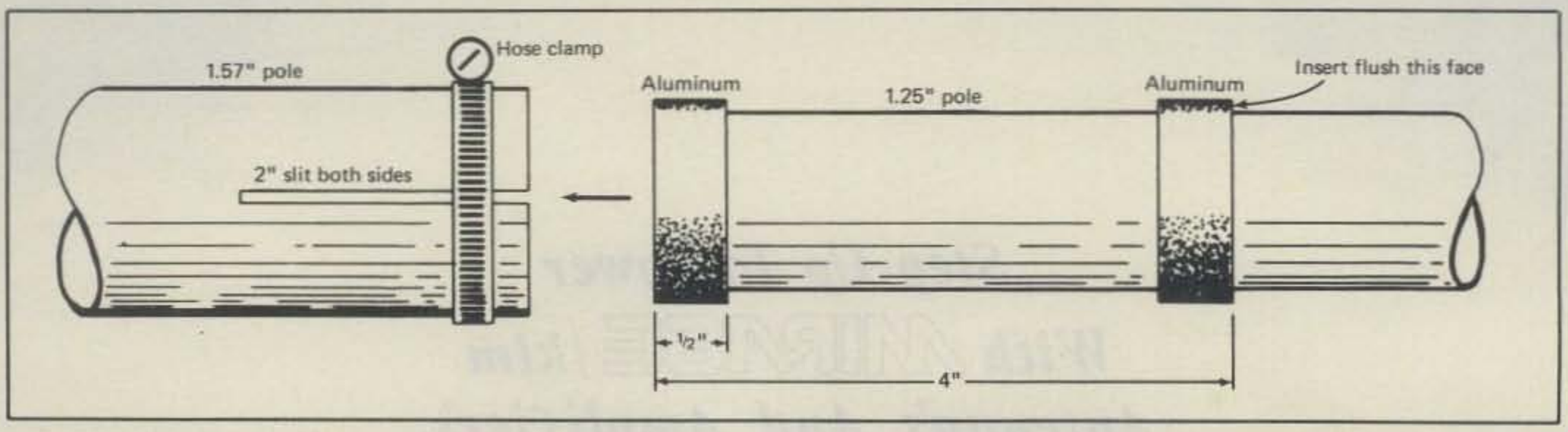
Construction of the Antenna

Fig. 5 shows the dimensions and element spacing of the 17-element NBS Yagi with dimensions modified for 146 MHz operation. The driven-element length has been adjusted for 5/16 diameter tubing and shortened for the T-match. In my article "Homebrewing Antennas With Copper and Brass," *CQ*, April 1985, I describe a method of scribing a straight line on round pipe. This method was again used, but a problem arose with the fibreglass pipe. It does not have a uniform diameter. This was solved by making the hole diameter in the slide block equal to the largest diameter encountered on the fibreglass pole. It was then slid along the boom by keeping it cocked against the sides of the boom. The mark line came out straight. I think it would be very hard to make a straight line on a tapered boom, but if possible, it sure would save on weight.

As shown in fig. 6, a small vise was used to scribe the vertical line on both sides of the boom. This cross mark should be carefully punch-marked, and a small drill should be used initially to make the first hole. Drills have a tendency to wander, and offset drilling shows up rather glaringly when the elements are slid in. Fig. 7 shows an element being glued in place with epoxy cement. The marking tape holds it in place. The epoxy does nothing more than hold the element in place and seal the hole. The real holder is the foam insulation shot through a small hole into the boom. This is the stuff sold in hardware stores for sealing out drafts in homes. A small squirt is adequate, and I did both antennas with one can. The stuff hangs on for dear life, is very light, and is an excellent insulator. It continues to expand for about a half hour, and I would suggest trying it out on a piece of scrap to get the feel of how much is needed to fix the element in place. A shot of foam at both ends also helped seal the boom from moisture.

The dimensions of the T-match are listed in fig. 9. The material is copper or brass including the screws. I adjusted the SWR to 1:1 by making the same changes on both sides of the T-match. Earlier I mentioned that two size poles were used, the lighter one in front. Fig. 10 shows the method and dimensions used for mating the two pipes. Electrical tape was wound over the junction to keep out moisture, and a hose clamp holds them firmly together. I am well satisfied with the result and have been able to copy some rather weak stations. No mechanical problems have developed except for some birds who were determined to make a condo out of the rotor. That garbage can is rather roomy. CQ

Fig. 10– The method of joining two fibreglass pipes.



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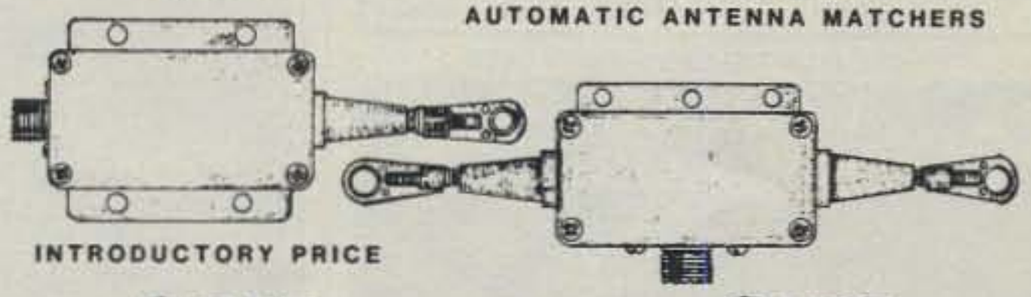

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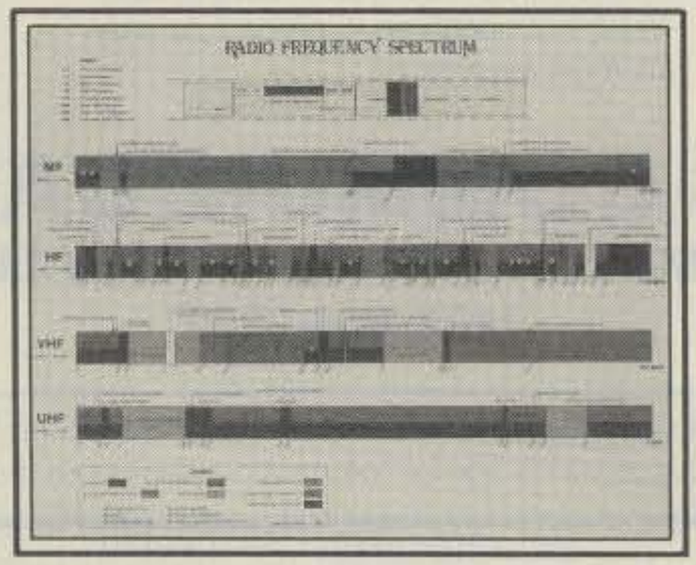
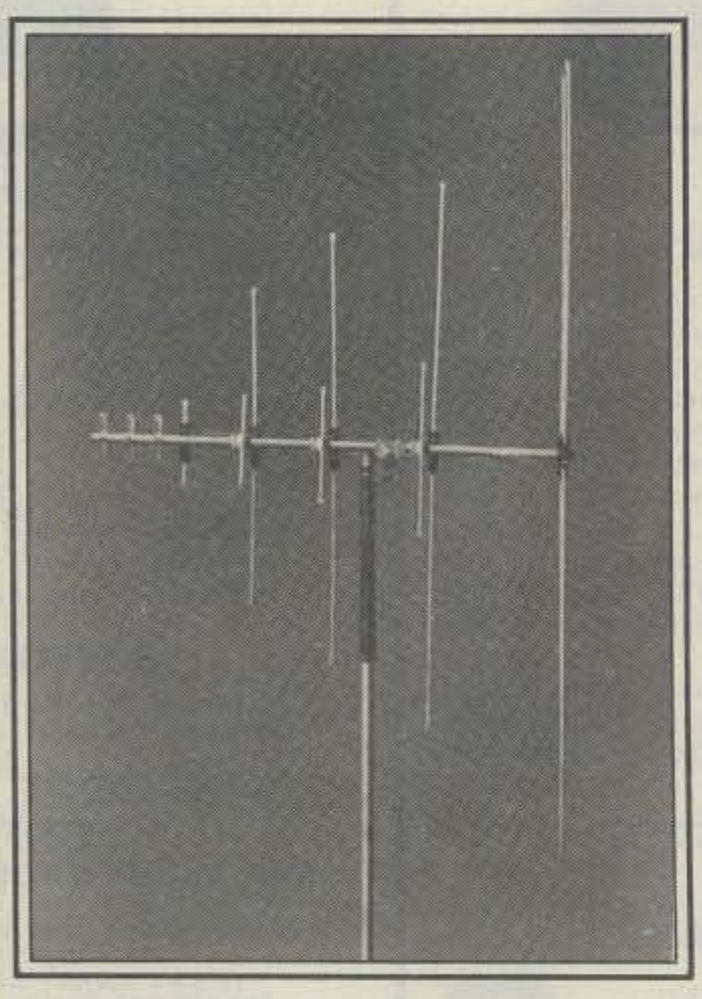
Robert Rover, KB6DYM's Radio Frequency Spectrum chart is now in print. This standard-frame-size (16″ × 20″) poster shows the amateur, shortwave, and maritime mobile bands and their relationship to each other in a colorful display. It's a kind of "road map to the skies." Made specifically for amateurs, shortwave listeners, and scanner enthusiasts, it is also a helpful visual aid for your listening post or classroom.



The poster is priced at $4.50 plus $1.50 for shipping and handling and can be ordered by writing to Robert Rover, KB6DYM, 2135-B Columbia Street, San Diego, CA 92101 or circle number 106 for more information. Schools and others write for quantity discount.



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Balun transformer, offset pipe, and all mounting hardware is included (requires TV-type F connector on your coax). Approximate size is 6′H × 4″ L. The scanner beam is $40 plus $3 shipping via UPS or $6 via US Post Office within the U.S. Foreign customers should request shipping information and cost. For more information, contact Grove Enterprises, P.O. Box 98, Brasstown, NC 28902, or circle number 102 on the reader service card.

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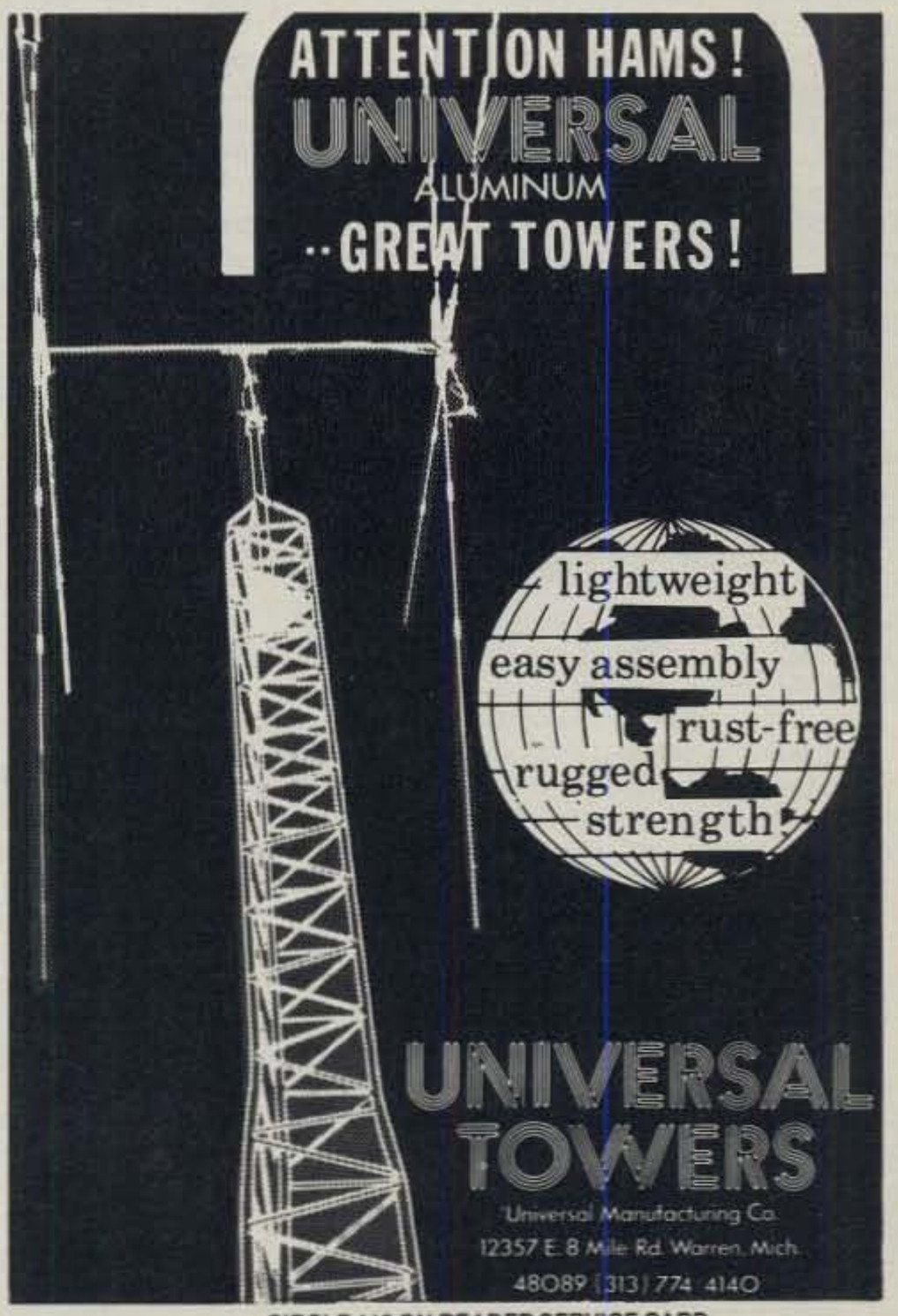

CIRCLE 116 ON READER SERVICE CARD

Packet sounds like fun. You decide to give it a try. Whether you build a kit or buy one of the available units, you finally get it to the operating desk. Now what? What do you do with it and what can you do with it? The answer is quite a bit, even if you're not the technical type.

Packet Radio
How To Work It (*Not* How It Works)

BY RICHARD S. MOSESON*, N2BFG

So the packet bug has bitten you—or maybe it's just nibbling at your ankle and you want to find out more about this new facet of amateur radio. You've read magazine articles and learned all about the technology, but most of the authors seem so awed by the technology that they forget to tell you what to do once you get on the air. This article will be different. It's all about packet operating—how to work it instead of how it works.

In keeping with tradition, though, I'll start with a *brief, simple* technical explanation. (I promise: no more than two paragraphs, and it won't get complicated.)

Packet radio is a fancy form of radioteletype (RTTY). It requires a personal computer or other terminal with an RS-232 output, a packet control unit (called a TNC, or Terminal Node Controller; if you want to find out what that means, find a technical article) and an amateur transceiver. The TNC plugs in between the terminal (computer) and the transceiver (radio). A disc drive and a printer are helpful, though not essential.

Packet radio gets its name from the fact that each transmission consists of a "packet" of data including the callsigns of the originating station, the destination station, and any relay stations in between. It also contains the information you're sending, plus some computerese (which you never see on your screen) to let your TNC know if it has received the packet correctly.

A couple of other basic definitions:

Digipeater: A digital repeater, used for relaying packet signals. Similar in function to a voice repeater, but with a twist: It doesn't receive and transmit simultaneously, and it doesn't operate split frequency.

A packet repeater, operating simplex, "stores and forwards" your data. It receives what you send out, holds it in its memory, and when there's a clear spot on the frequency, automatically sends your packet along the way. **Any packet station may be a digipeater.** However, the term usually applies to those stations used exclusively as packet repeaters.

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PBBS: A Packet Bulletin Board System. An electronic "mailbox," accessible by packet radio, on which users may leave messages for other people; pick up messages left for them; send (upload) and receive (download) program or text files for general use.

Connect/Disconnect: The words used on packet for making and breaking contact with another station.

ACK: A mild form of what you're likely to yell when you do something wrong. Also, an "Acknowledgement" sent by the destination station to the originating station letting it know it got the packet correctly. The originating station will send a packet or group of packets over and over again until it receives an "ACK" from the destination station.

Path: The routing of a connection that goes through one or more digipeaters. You can link several digipeaters and give yourself a path from Boston to Washington. But you'll wait quite a while to get an "ACK" from a station to which you're connected over such a long path.

EASTNET (and SOUTHNET and TAMMNET, etc.): Established networks for linking digipeaters and bulletin boards. Maps of these networks are available on most bulletin boards. They'll help you in plotting the best path to a distant station.

Okay, enough definitions for now. We'll cover more as we go on—packet radio has its own little language—but we'll take care of them as we need to deal with them.

On The Air: Fun and Frustration

Most packet activity today is on 2 meters. The most commonly used frequencies are 145.01 (the busiest), .03, .05, .07, and .09. In addition, some areas are using 147.55 for packet communications. (Listen around in your area for the "brrrp brrrp" sound of packets flying through the air. If you hear nothing after a few minutes on 145.01, try your luck on 147.55.)

There is also some HF packet activity, mostly centered on 14.103 MHz, and the packet "establishment" is working on a 220 MHz "backbone" or "trunking" system for linking digipeaters and bulletin boards.

What's it like on the air? It's a combination of fun and frustration—heavy on the latter for the newcomer who's just learning the ropes. The fun part is when you actually succeed in connecting with someone a couple of hundred miles away and carry on a QSO unhampered by the other stations on frequency. The frustrating part is when there are so many other stations on frequency that it takes ages (15–20 minutes, sometimes) to get a single transmission through and acknowledged. Let's look more closely at each part—the fun first.

There's virtually no interference. When you're connected with someone, your TNC will recognize and interpret only those packets addressed to you. You'll hear the others going by, but nothing will show up on your screen. Since each packet is a brief burst, there's room in between your packets for the packets of other stations. So, one frequency can support several QSOs simultaneously.

Your TNC will also ignore any packet that doesn't "add up right." Part of the coding in each packet is a "checksum" that your computer reads. If the packet is garbled in any way, the checksum will be wrong and your TNC will refuse it. (It will either do nothing or, in some TNCs, will send back a "NACK," a *non*-acknowledgement. So you may hear your TNC "speak," even though nothing shows up on your screen.) When the packet arrives correctly, the TNC sends back an "ACK."

This system makes your copy virtually error-free, which makes packet radio great for data transfer, either of computer programs, general information, or formal message traffic. Anyone who has ever tried to interpret garbled RTTY signals will appreciate the value of error-free communications.

Another advantage of packet radio is the use of PBBSs, which not only let you leave or pick up personal messages, and post or read general information bulletins, but also forward messages automatically from one BBS to another, even if the destination is hundreds of miles away.

Finally, there's the potential for 2 meter "DX," using a string of digipeaters to let you talk with someone a couple of hundred miles away—or, through HF/VHF gateways, a few thousand miles away.

But now come the frustrations: The same

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system that guarantees you error-free copy can also drive you straight up the wall. Because if the frequency is very busy, and especially if you're going through more than one digipeater, it can take several minutes for a single transmission to get through correctly *and* for the ACK to get back correctly. Your TNC will keep sending the same packet(s) over and over until it receives an ACK or reaches its "retry" limit, which you program in. A multi-digipeater path complicates matters because most digipeaters can hear more than you can, so they may wait forever for a clear frequency on which to retransmit your packet.

Another problem on a busy frequency is "collisions." Two packets sent simultaneously (or nearly so) can bump into each other and result in both being garbled. They'll both be resent, but on a busy frequency it often takes many "retries" before a packet will get through intact.

If you live in or near a big city, or in any area with a lot of packet activity, you're bound to encounter an overcrowding problem on 145.01. Severe overcrowding reduces "throughput," a fancy word meaning information that gets through. There are two major causes of this overcrowding:

(1) Competition between rag-chewers and bulletin boards. Trying to hold a QSO on the same frequency as a PBBS that's dumping a 12K file to someone is nearly impossible. The BBS goes on seemingly forever, and you can't get a packet in edgewise.

On the other side of the coin, lots of QSOs going on can reduce the "throughput" of the BBS, making it have to repeat material several times. The problem is the worst during evening hours—"prime time." But it can be just as bad at "off-peak" hours, since those are used by the BBSs to forward messages from one to another.

Implementation of a 220 MHz "backbone" system for linking BBSs will help relieve some congestion, but full implementation is still a long way off. One way to relieve this pressure is to refrain from "uploading" or "downloading" lengthy files during prime time.

(2) For any type of long-distance QSO, there's no practical alternative to 145.01. Other frequencies are in use, and many have digipeaters operating on them. But so far only .01 has the network of linked digipeaters that makes long-distance connections possible.

If you live outside an active packet area, you might encounter just the opposite problem—nobody to talk to. Particularly if you're limited to VHF, as most TNCs are (because the tones and the data transmission [baud] rate are different on HF), you're dependent on the presence of digipeaters—or nearby stations through which you can digipeat—in order to talk with anyone outside your immediate local area.

If these aren't available, you'll be "braaaping" away to yourself. (This probably won't stay a problem for long, as prices of TNCs are dropping quickly and sharply.) If there isn't much packet activity where you live, get a friend to buy a TNC when you do. You'll have each other to talk with, and as other amateurs come to see what it's all about, the problem will solve itself.

Operating Practices

There's one other primary cause of frustration in operating packet: poor operating practices, and—for people trying to learn the proper way to do things—no readily available source of information on good operating practices.

It is hoped that this article will eliminate the latter part of that problem and help with the first part.

The first step in developing good operating practices comes before ever going on the air. It's vital to understand and properly set the assorted parameters that determine the nature of what you send out and what you see on your screen or printer. This requires learning a whole new language (just as you did when you first got into amateur radio).

My TNC (the AEA PK-64) has some four dozen different parameters, but don't worry. I'll just cover the most important ones here. (Unfortunately, different TNCs have different names for some parameters. I've tried to list all possibilities, but if you can't find something I mention here, dig a little deeper.)

First and foremost, before you do anything else, and especially before you go on the air, set "MYCALL." It tells the TNC your callsign, which sets your station ID on each transmission. I got a call this morning from " ." He'd forgotten to plug in his call and my screen said "Conn to ." I had no idea who I was talking to. Most TNCs let you abbreviate the command as MY, so all you have to type is "MY (your call)," then hit return.

ACKS and FRACKS

While some commands and parameters are in fairly plain English (Connect, MYCALL, etc.), others are pure computerese. We've already covered ACK. But you also need to know about FRACK, DWAIT, PACLEN, and MAXFRAME. (For others, such as AXHANG and LCOK, you'll have to check your TNC manual.)

FRACK is short for Frame Acknowledge. Packet pioneer Doug Sharp, WB2KMY (known in the east as "Pacman"), explains that FRACK "tells your TNC how long to wait for an acknowledgement before doing a retry. If it sends out a retry too quickly, you run the risk of crashing into your own acknowledgement—especially if you're using multiple digipeaters." While many TNCs come with the FRACK set at 3 or 4, Doug suggests setting it at 6 or 7.

DWAIT, says Doug, "essentially tells the TNC how long the frequency must be clear before sending a packet." Generally, each unit is 40 milliseconds, and Doug recommends setting DWAIT at a minimum of 2, possibly even 3 or 4. (You'll never notice those missing milliseconds.) The TNC 2 and its clones provide 10 milliseconds per DWAIT unit. If you have one of those multiply by 4. And even if it eventually adds up to four or five whole seconds extra, "your waiting five extra seconds," says Doug, "saves each of your neighbors waiting an extra minute."

Equally important are PACLEN and MAXFRAME. **PACLEN** sets the length of each packet (anywhere from 0 to 255 bytes). My TNC came set at 128—meaning that each packet contains 128 bytes of data. And as you're typing, each time that limit is hit, the TNC automatically sends out what you've typed so far. (If you finish a message before hitting the PACLEN limit, hit "return" and what you've written will be sent.)

Sharp says he's found 128 is a good average length, but in crowded situations you'll do better to drop your PACLEN to 64 or even 16. On a busy frequency short packets have a better chance at getting through than do long ones. In my early days on packet I dropped my PACLEN from 128 to 40 (one screen line) and increased my "throughput" dramatically. I now keep it around 64.

MAXFRAME works together with PACLEN in determining how much goes out on the air, and how quickly. MAXFRAME is the maximum number of packets (frames) your TNC will send out before getting an ACK. For example, a MAXFRAME of 4 means your TNC will send out a maximum of four unacknowledged packets. It'll keep sending those four until it gets an ACK. If there's more to send, the TNC will wait until it receives an ACK for the first four, then send out four more.

This, by the way, won't affect your typing. Waiting material will be held in a buffer and sent out in turn. The rule of thumb, says Sharp, is "when things get rough, shorten things up."

WB2KMY's Guidelines

	Avg. QSO (uncrowded freq)	File Xfer (uncrowded freq)	Crowded Freq. (esp. evenings)
FRACK	7	7	7
DWAIT	3	2	4
PACLEN	128	256	64 (or less)
MAXFRAME	4	7	2

Other parameters, such as **TXDELAY** (which sets the length of time your TNC waits after keying up the transmitter to send data), depend on your individual rig. Experiment.

RETRY is also important. When you're connected with someone, your TNC will send the same packet over and over again until it reaches an ACKnowledgement or reaches its RETRY limit. When the TNC "retries out," it disconnects your station. TNC-1s and their clones will then give up and wait for your instructions. Newer TNCs will automatically try to reestablish the connection. If it can't be done in a certain number of tries, the newer TNCs will give up, too.

The RETRY parameter can be set at any value from 0 to 15. The busier your area is, the higher you'll have to set the number. The exception is 0 (zero). That turns off the counter—and the TNC will try forever, until it gets an ack or you manually disconnect. (We'll have more on that later.)

One parameter which affects only incoming signals—but which can be very useful—is **MONRPT** (perhaps abbreviated differently on different TNCs). It stands for MONITOR REPEATER. When it's off, your screen displays only the callsigns of the sending and receiving stations. Turning on MONRPT displays the "path" by which the message is routed—listing all the digipeaters in the path and putting a * or some other symbol next to the one you're hearing. This helps you see which stations you can copy directly, and determine the best path to use to connect with other stations. (This feature is not available on the TNC-1 and its clones.)

And that brings us to the last off-air "good operating practice": listen (watch, actually). See who's on the air, who you can copy directly, whether your local PBBS is busy, etc. It's amazing what you can learn about operating practices in your area simply by observing what other people are doing.

If you listen and hear packet bursts, but nothing is coming onto your screen, check your volume level. The receive volume should be just loud enough to "decode," to solidly light up the DCD light on your TNC. If it's too loud, it'll distort and garble the signals. Transmit levels (monitored on another radio) should

Say You Saw It In CQ

be, as Doug Sharp puts it, "just loud enough to be irritating."

Operating Practices: On Air

Transmitting on packet is different from just about any other mode. For starters, there's no manual transmit/receive switch. As you type and reach your PACLEN limit, a packet is transmitted *automatically*. You can manually send something by hitting RETURN. But your rig automatically returns to receive after the packet is sent.

Your transmitter may also turn on all by itself periodically and send something out that doesn't show up on your screen. Chances are, it's one of three things: (a) a retry on a packet already sent once; (b) an ACK or NACK (not acknowledged) in response to a received packet; or (c) signals from another station, being digipeated through yours.

Each TNC can be switched between three different operating modes: Command (CMD), Converse (CONV), and Transparent (TRAN). The TNC normally comes up in the CMD mode, meaning that anything you type will be seen by the TNC as a command. It is not sent out on the air.

What you see on your screen is determined by a couple of other parameters. In order to "read the mail," or copy all packets you can hear, make sure that **MONITOR** and **MALL** (Monitor All) are both set to ON. (Some newer software replaces these two "toggles" with a single MONITOR parameter which can be set at any value from 0–6. Set it at 2 or higher to "read the mail." I leave mine set at 3.)

As soon as you're connected to someone, the TNC switches into the **CONV** mode. Here, whatever you type on the keyboard is sent out on the air to the other station, and the TNC ignores any incoming packets from other stations. Plus, it strips off the callsign info from packets headed your way, so all that appears on the screen (or printer) is the message text. (This feature can be changed, by turning on the MONCON or MCON parameters, to let you monitor other packets while connected to someone.) In order to DISCONNECT, you have to switch back into the CMD mode.

The third mode is **TRANS**parent. This passes all properly sent or received data without trying to interpret it. Basically, it's used to transfer programs and binary files which may have commands embedded in them—without having the TNC or the computer try to follow those commands.

On *some* TNCs it's difficult or impossible to get out of the TRANS mode without shutting the unit off and turning it back on again. That's because you've told it to ignore all commands, so it won't listen when you tell it to do something different. (Remember, these machines aren't smart; just fast.)

Making Contact

Calling a station (or "connecting") on packet is easy. To initiate a contact tell the TNC "Connect to (callsign)." Or abbreviate it "C (callsign)." If you can't connect directly and need to go through one or more digipeaters, add the "via" command. For example, when I connect to the W2VY-1 BBS, I go through the N2DSY-2 digipeater. So I type "C W2VY-1 V (or VIA) N2DSY-2." I need an extra hop (and a different path) to connect to WA2RKN's BBS. So I type "C WA2RKN-2 V WB2VUK, WB2KMY-1." I know WB2VUK has a direct shot to the WB2KMY digipeater, so—even though he's not officially a digipeater—I connect through him to KMY-1 and on to the BBS.

By now, you're probably asking, "What are all those funny numbers after people's callsigns and what do they mean?" They're known as callsign extentions or **SSID**s, or Secondary Station IDs. Since you're not permitted to use the same callsign for two or more stations operating simultaneously from different places —and since digipeaters are not repeaters in the true sense—the system of SSIDs was developed to differentiate separate stations operating under the same callsign. The packet "protocols" allow for up to 15 SSIDs.

Unfortunately, there's no agreement on how to assign the numbers. The only agreement is that "-0" is assumed on a call without an SSID, and that that's generally used for the individual amateur operating his own packet station. But that's not always true either.

AI2Q runs a bulletin board under just his callsign. If you want to talk to him, you connect with AI2Q-1. The Ramapo Mt. ARC in New Jersey operates a PBBS, WA2SNA-1, and a digipeater, WA2SNA-2. But if you go north a little way, Mount Beacon (NY) ARC's digipeater is WB2KMY-1 and its PBBS is WA2RKN-2. ARRL Headquarters has its BBS, W1AW-4, accessible through its digipeater, W1AW-5. And along the way you find the KG1O-9 digipeater.

It's thoroughly confusing and there's no sign that the packet community is about to agree on any convention for SSIDs. Just watch the stations in your area to see which ones use which SSIDs for what purposes. And try not to get too confused. Doug Sharp, WB2KMY, tells of a newcomer who tried to connect with him for a couple of weeks, but kept getting busy sig-

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nals—because he was trying to connect with WB2KMY-1, the digipeater. And there was no one there to respond.

As for your own ID, one of the great things about packet is that you don't have to consciously send one. Your TNC does it for you—every time it sends out a packet. As this is generally your only form of ID, and it's read by the TNCs of receiving stations and bulletin boards, it's **essential** that you set the MYCALL command on your TNC before going on the air.

One other thing: If your TNC has a CW ID, turn it off and leave it off. A CW ID is no longer required by FCC rules, and using it only creates clutter.

Okay, your callsign and other parameters are set, and you're ready to go on the air and call CQ. Well, it's not as easy as typing "CQ CQ CQ from N2BFG," as you might on regular RTTY. The best way is to use your **UNPROTOCOL** mode, which sounds complicated, but simply means your packets are not directed to anyone in particular.

The unprotocol "destination" is set with the UNPROTO command (abbreviated U). Most stations set this as CQ. Others use TEST. Some BBSs use QST or MAIL (followed by a listing of stations with messages waiting). To set the UNPROTO "destination," enter the command mode and type U (DESTINATION). (You can also program in a digipeater, as: U CQ V (CALLSIGN) to have your UNPROTO message sent through your local digi.)

If your TNC provides message buffers, type your CQ message into one of them (example: CQ from N2BFG, Rich in N. Tarrytown, NY). This will save you from typing the same message over and over again. Next, enter the CONVerse mode (by typing CONV) and send your message. Repeat occasionally until you get an answer. There's no need to send more than one or two CQs in a minute, and if you don't get a response, there's no point in sending an endless string. Wait a few minutes and try again. Don't abuse the CQ.

Some stations use their **BEACON**s to call CQ. When there were very few packet stations on the air, beacons were often left on all the time to let other people know you were out there, and that your station was available for digipeating. Today, though, the network of full-time digipeaters has grown to the point where constant beacons are unnecessary and do nothing more than clutter the frequency.

The big problems with using your beacon to call CQ are clutter and the fact that it's all too easy to leave it on after someone connects with you. That results in your continuing to call CQ while you're in QSO. And by all means, never leave a beacon on when you leave the shack.

There's very little that's more annoying than responding to a CQ and getting a busy or, worse yet, a "connect message" saying "I'm not here now; please leave a message and call back later." If you're not there, then why are you calling CQ??!! I don't know about you, but I like to talk to people, not to machines. And if I see someone calling CQ, I expect that person to be there, in person, to answer my call.

A simple rule on beacons: Don't use them. Call CQ manually—and sparingly.

Now, what's a "connect message"? It's a brief message that you type in once (using the **CTEXT** command) and that can automatically be sent to anyone who connects with you. (It's toggled on and off with the **CONMSG** parameter.) Some connect messages are simple, such as "Hi from Rich in N. Tarrytown, NY," that can save you retyping redundant greetings. But since most CQ messages say something like "CQ from N2BFG, Rich in N. Tarrytown, NY," it's redundant anyway.

So many people use their connect messages like the message tapes on answering machines: "I can't come to the TNC right now, so please leave a message, then disconnect." Messages like these are handy if you're going away for a while, but are leaving the TNC on. Your receive buffer will be happy to take a message for you.

The message here, though, on the connect message, is to use it sparingly. Turn it on when you're away from the shack or don't want to get involved in a QSO. But when you're sitting there looking for a ragchew, shut it off.

Talk To Yourself

My first packet QSO was with myself! I wanted to find out if I could make it to my local digipeater. Since the digipeater doesn't start transmitting until you're finished sending, you can monitor your own signals being digipeated. And you can connect with yourself! It's an excellent way to check a path or to determine whether a particular digipeater is on the air. Don't have long conversations with yourself, though. When you're satisfied you have a good link, disconnect.

When you've finally made contact with someone, the object is to carry on a good QSO. Presuming your signals are getting through okay and your packets are being "ACKED" with some reasonable regularity, you stand a reasonably good chance of succeeding.

One interesting facet of packet communications is that while you *may* sit and wait for the person you're talking with to finish typing, you may also carry on a semi-duplex QSO.

Since the TNC automatically sends out a packet whenever the PACLEN is reached, you can have a partial comment on your screen for 20 or 30 seconds (or more) before the rest of the message comes in. There's nothing to stop you from responding to what you see—or talking about something completely different—while waiting for the other guy to finish his piece. It's a bit disconcerting at first, since you can end up carrying on two different QSOs at the same time with the same person, and some people don't like it. But others find it to be great fun.

One big question faced by novice packeteers is, "How do I know when the other guy's finished sending?" After all, there's no exchange of IDs and no need for a "back to you," especially if you're both talking at once. The convention that's been adopted for "end of transmission," at least in the east, is two or three angle brackets, ">>" or ">>>". Until you see the brackets, you can assume there's more to come.

A few paragraphs back I mentioned "busy signals." When you try to connect to someone who's already connected to someone else, his TNC will respond with a "busy." Your screen will print "(CALLSIGN) BUSY—DISCONNECTED." At the same time a line will appear on the other person's screen, saying, "CONNECT REQUEST FROM (YOUR CALLSIGN)." So, he knows you're looking for him and he can call you when he's done.

Some newer TNCs contain provisions for multiple connects. Mine will let you talk with up to ten stations simultaneously. (You set the maximum with the CONMAX command.) Each QSO is taken in on a different "channel," letting you conclude an exchange with one per-

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son before looking to see what the other person has sent.

This can be lots of fun, but I'd recommend it only to someone who's already comfortable with general packet operating. Otherwise, it's just too confusing.

Even though many TNCs limit you to one connection at a time, it is still possible to conduct a net or roundtable. Again, it's probably best to wait until you're familiar and comfortable with the regular operating techniques before trying this.

A net operation is pretty easy if the net control has a TNC capable of multiple connects. Then each person connects with the NCS, making him the center of a "star." But while net members can monitor what others are saying (by turning their MONCON or MCON parameter on), they can only talk directly to net control. If they're passing traffic, they'd have to disconnect and then connect with each other off frequency.

Another way of having a group QSO is by using the UNPROTO mode. (See previous section on calling CQ.) In this way nobody's connected to anyone in particular, and all can see what each is sending. If any two stations want to pass traffic, they can move off frequency and connect to each other.

The only problem with the UNPROTO mode is that since you're not connected to anyone, you can't get ACKs, so each packet is sent only once and you have no assurance that any of them are getting through.

Ending The QSO

When you're done talking with someone you can't just shut off your rig and walk away. Well, you could, but the other person's TNC would still think it was connected to yours. Ending a QSO properly requires a DISConnect. Doing it is rather simple. Return to the command mode, type D, hit return, and wait while your TNC does the rest. **You're not disconnected until the TNC says you are.** In order to complete a disconnect, your DISC request has to be properly received by the other station, and your TNC has to receive its acknowledgement. Only then does your status change from "DISC in progress" to "DISCONNECTED."

Now there is a thing called a "Unilateral Disconnect." And you do it by sending two disconnect commands in a row. This will immediately put you in a DISCONNECTED state, but it leaves the other station hanging. You should only use this when you know the other station has already disconnected from you, or if you know the path is lost (i.e., if the digipeater you're using goes off the air).

One other time that you can get away with using a unilateral disconnect is when you're switching to another path. This has to be done pretty quickly. What you do is send two disconnects, then immediately send a connect request to the same station via a different path. Generally, a TNC will accept a connect request from a station to which it thinks it's already connected, and it won't give you a busy.

The Automatic Station

Many people think that one of the greatest things about packet is that you don't have to be at your station for someone to connect with you and leave a message. These folks leave their TNCs on full-time, and when they're not there in person, leave them on automatic—set up to receive only messages directed to that station.

They leave their CONMSGs turned on to send out their "I'm not here" message. Connecting stations then leave a message and disconnect. This is great and, as of a recent FCC ruling, it's also legal. (Before that, automatic operation of stations other than repeaters and satellites had been illegal below 220 MHz. The new rule permits automatic operation anywhere above 50 MHz.)

Here's how to do it: First, make sure you're in the command (CMD) mode. Next, set your MONITOR to OFF or 0 (zero). (As long as you leave your CONOK parameter set to ON, your TNC will automatically respond to a connect request, even if the MONITOR is off.) Now, only those messages sent to you during a connected QSO show up on your screen or printer.

Next, turn on your Connect Message (CONMSG), making sure the text reads as you want it to, and go away. Your TNC will connect to anyone who wants to talk to you, send them the message that you're not around, and let them leave you a message. When you return, you can look through your buffer and see who has left messages (or, if you've left your printer on, you'll have hard copy).

This system is great if you want to leave your TNC, computer, and radio turned on at all times. For those who don't, there is another way to leave messages—Packet Bulletin Board Systems (PBBSs).

Using PBBSs will be the topic of another article, along with a look at packet's future. CQ

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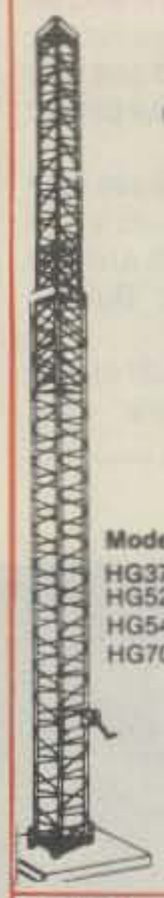

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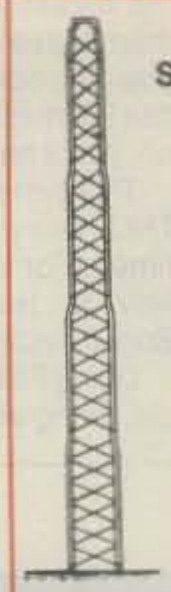

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HBX40	40 ft	10 sq ft	164	$329
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HBX56	56 ft	10 sq ft	385	$499
HDBX40	40 ft	18 sq ft	281	$399
HDBX48	48 ft	18 sq ft	363	$489

*Your Total Delivered Price Anywhere In Continental 48 States. Antenna Load Based on 70 MPH Wind.

ROHN

Guyed Tower Packages

- **World Famous Rohn Quality and Dependability**
- **Rugged high wind survival-provides safe installation**
- **Multi purpose towers satisfy a wide range of needs**
- **Complete packages include: guy hardware, turnbuckles, guy assemblies, w/torq bars, concrete base, rotor plate and top section per manufacturers specs.**

Packages shown below are rated for wind zone "B" (86 mph wind). Zone "C" (100 mph wind) design prices slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

	Model 25G	Model 45G	Model 55G
50'	$ 579	1079	1439
60'	639	1209	1609
70'	689	1329	1759
80'	849	1479	1929
90'	919	1749	2089
100'	989	1899	2259
110'	1189	2019	2639
120'	1259	2179	2819

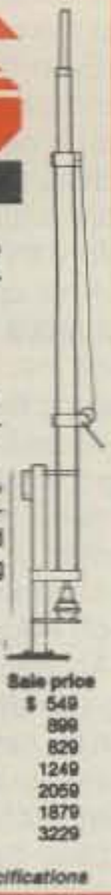
US TOWER CORPORATION

These rugged crankup towers and masts now available from Texas Towers!

Check these features:
- All steel construction
- Hot dipped galvanized
- Totally self-supporting-
- No guys needed

Coax arms, Thrustbearings, Masts, Motor drives, Remote controls, Hinged bases, rotor bases, & raising fixtures also in stock—

CALL FOR SALE PRICES!



Model	Min. Ht.	Max. Ht.	Ant. load*	Sale price
MA40 mast	21'	40'	10 sq ft	$ 549
MA50 mast	22'	50'	10 sq ft	899
TX438	22'	38'	18 sq ft	829
TX455	22'	55'	18 sq ft	1249
TX472	23'	72'	18 sq ft	2059
HDX565	22'	55'	30 sq ft	1879
HDX572	23'	72'	30 sq ft	3229

*Note—towers rated at 50 mph to EIA specifications

RG-213U

$.29/ft $279/1000 ft
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials
- Guaranteed Highest Quality!

RG-8X

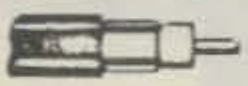
$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield
- Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10 MHz	30 MHz	150 MHz	450 MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE/HELIAX™



Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket	$.79/ft
½" LDF4-50 Andrew Heliax™	$1.79/ft
⅞" LDF5-50 Andrew Heliax™	$3.99/ft

select connectors below.

HARDLINE & HELIAX™ CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$19	$19	$19	$25
½" Heliax™	$25	$25	$25	$25
⅞" Heliax™	$49	$49	$49	$49

AMPHENOL CONNECTORS

Silver PL259 ..... $1.25
UG21B N Male ..... $2.95 UG23D N Female $2.95

Antenna Wire & Accessories

Solid Copperweld	12 ga. $.12/ft	14 ga. $.10/ft
Stranded Copper	14 ga. $.10/ft	16 ga. $.09/ft

¼ mile 18 ga copper-clad steel wire $30
6 inch heavy-duty end insulator ..... $3.00/ea.
Dog-bone insulator $.79 Coax seal $2.50

Van Gorden

1:1 Balun ..... $11 Center Insulator $6
Dipole Kits D80 $31/D40 $28
Short Dipole Kits SD80 $35/SD40 $33
All-band Dipole w/ladder line $29
G5RV all band antenna $49

ALPHA DELTA

DX-A 160-80-40 Sloper $49

CUSHCRAFT

A3 3-el Tribander Beam	$209
A743 30/40 mtr Kit for the A3	$75
A4 4-el Tribander Beam	$269
A744 30/40mtr Kit for the A4	$75
R3 20, 15, 10mtr Vertical	$259
AV5 80-10mtr Vertical	$99
D40 40mtr Dipole	$149
40-2CD 2-el 40 mtr Beam	$279
A50-5 5-el 6 mtr Beam	$79
215 WB NEW 15-el 2 mtr Beam	$75
4218 XL 18-el 2 mtr Beam	$95
3219 19-el 2mtr Beam	$89
220B 17-el 220MHz Beam	$89
424B 24-el 432MHz Beam	$75
ARX2B 2mtr Vertical	$39

hy-gain

Discoverer 2-el 40-mtr Beam	
Discoverer 3-el Conversion Kit	
EXPLORER-14 SUPER-SPECIAL	
QK710 30/40 mtr. Add-On-Kit	
V2S 2-mtr Base Vertical	
V4S 440MHz Base Vertical	
TH5MK2S Broad Band 5-el Triband Beam	
TH7DXS 7-el Triband Beam	
TH3JRS 3-el Triband Beam	
205BAS 5-el 20-mtr Beam	
155BAS 5-el 15-mtr Beam	
105BAS 5-el 10-mtr Beam	
204BAS 4-el 20-mtr Beam	
64BS 4-el 6-mtr Beam	
12 AVQ 20-10 mtr vertical	
14 AVQ 40-10 mtr vertical	
18 AVT/WB 80-10mtr Vertical	
18HTS 80-10 mtr Hy-Tower Vertical	
23BS 3-el 2 mtr Beam	
25BS 5-el 2 mtr Beam	
28BS 8-el 2 mtr Beam	
214BS 14-el 2-mtr Beam	
2BDQ 80/40 mtr Trap Dipole	
5BDQ 80-10 mtr Trap Dipole	
BN86 80-10 mtr KW Balun W/Coax Seal	

Limited Quantities purchased at old prices. Call for current prices.

HUSTLER

6BTV 80-10 mtr Vert	$129	5BTV 80-10 mtr Vert	$109
4BTV 40-10 mtr Vert	$89	G7-144 2-mtr Base	$119
G6-144B 2-mtr Base	$89		

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT ELECTRONICS CO

HF6V $129 Delivered (Cont. USA)

- Full Legal Power 80/10 Meters
- Optional Stub Tuned Radial Kit Model STR II $29
- Optional Roof Mounting Kit Model RMK II $49 (includes STR II)
- Optional 160 Meter Resonator Kit Model TBR 160 $49

HF2V 80/40 Meter Vertical Antenna $129 Delivered (Continental USA)

- Optional 160 Meter Resonator Kit Model TBR 160 $49

HF4B "Butterfly" $189. (del. cont. USA)
- Covers 10, 12, 15, 20M
- Compact Beam Design
- Max. Element Length of 12.5'
- Light Weight, Only 17 lbs.
- Use with TV Rotor

Free Shipping On Butternut Accessories Also When Purchased With Antenna

KLM

KT34A 4-el Broad Band Triband Beam	$339
KT34XA 6-el Broad Band Triband Beam	$489
2m-14C 14-el 2-mtr Satellite Antenna	$89
2m-16LBX NEW-16-el 2-mtr Beam	$99
2m 22C NEW-22-el 2-mtr Satellite Antenna	$119
432-30LBX NEW-30-el-432 MHz Antenna	$99
435-18C 435 MHz Satellite Antenna W/CS-2	$119
435-40CX 435 MHz Satellite Antenna W/CS-2	$159

ROTORS

Alliance HD73 (10.7 sq ft rating)	$119
Alliance U110 (3 sq ft rating)	$49
Telex CD 45II (8.5 sq ft rating)	$Call
Telex HAM 4 (15 sq ft rating)	$Call
Telex Tailtwister (20 sq ft rating)	$Call
Telex HDR3000 Heavy Duty (25 sq ft rating)	$Call
Kenpro KR500 Heavy Duty Elevator Rotator	$189
Kenpro KR5400 AZ/EL Rotor Package	$319

ROTOR CABLE

Standard 8 cord cables $.19/ft (vinyl jacket 2-#18 & 6-#22 ga)

Heavy Duty 8 Cond cable $.36/ft (vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWERS

10 ft Stack Sections

20G $39.50	45G $112.50
25G $49.50	55G $149.50

All 20G, 25G, 45G and 55G Accessories In Stock at Discount Prices - CALL!

Foldover Towers	Model	Height	Ant Load*	Price
	FK2548	48 ft	15.4 sq ft	$899
	FK2558	58 ft	13.3 sq ft	$949
	FK2568	68 ft	11.7 sq ft	$999
	FK4544	44 ft	34.8 sq ft	$1199
	FK4554	54 ft	29.1 sq ft	$1299
	FK4564	64 ft	28.4 sq ft	$1399

25G Foldover Double Guy Kit $249
45G Foldover Double Guy Kit $269
*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.
All Foldover Towers Shipped Freight Prepaid Continental USA! Foldover Prices 10% Higher West of Rockies

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	$.15/ft
1/4 EHS Guywire (6650 lb rating)	$.18/ft
5/16 EHS Guywire (11,200 lb rating)	$.29/ft
5/32 7 x 7 Aircraft Cable (2700 lb rating)	$.15/ft
3/16 CCM Cable Clamp (3/16" or 5/32")	$.45
1/4 CCM Cable Clamp (1/4" Cable)	$.55
1/4 TH Thimble (fits all sizes)	$.45
3/8EE (3/8" Eye & Eye Turnbuckle)	$6.95
3/8 EJ (3/8" Eye & Jaw Turnbuckle)	$7.95
1/2 x 9EE (1/2" x 9" Eye to Eye Turnbuckle)	$9.95
1/2 x 9EJ (1/2 x 9" Eye & Jaw Turnbuckle)	$10.95
1/2 x 12EE (1/2" 12" Eye & Eye Turnbuckle)	$12.95
1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle)	$13.95
5/8 x 12EJ (5/8" x 12" Eye & Jaw Turnbuckle)	$16.95
3/16" Preformed Guy Grip	$2.49
1/4" Preformed Guy Grip	$2.99
6" Diam - 4 ft Long Earth Screw Anchor	$14.95
500 D Guy insulator (5/32" or 3/16" Cable)	$1.69
502 Guy Insulator (1/4" Cable)	$2.99
5/8" Diam - 8 ft Copper Clad Ground Rod	$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	$.29/ft
HPTG4000 Guy Cable (4000 lb rating)	$.49/ft
HPTG6700 Guy Cable (6700 lb rating)	$.69/ft
9901LD Cable End (for 2100/4000 cable)	$7.95
9902LD Cable End (for 6700 cable)	$8.95
Socketfast Potting Compound (does 6-8 ends)	$14.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
12 in Wall	$29	$49	$69	$89
18 in Wall	$39	$69	$99	$129
25 in Wall	$69	$129	$189	$249

ORDER TOLL FREE 1-800-272-3467

Texas, Alaska & for information 1 (214) 422-7306

VISA MasterCard

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Mon-Fri: 9am - 5 pm
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HF Transceiver
- 100% Duty Cycle
- 40 Memory Channels

CALL FOR SPECIAL PRICES!!

TS-930S LIST PRICE $1649
CALL FOR SPECIAL SALE PRICE!

TS-440S NEW! NEW! NEW!
CALL FOR SPECIAL SALE PRICE

TS-430S LIST PRICE $899.95
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TS-711A LIST $799.95
TS-811A LIST $899.95
CALL FOR SPECIAL PRICE!

TW-4000A LIST $599.95
CALL FOR SPECIAL PRICE!

COMPACT 2M FM MOBILE
TM 2570A (70W) LIST $549.95
TM 2550A (45W) LIST $459.95
TM 2530A (25W) LIST $399.95
CALL FOR SPECIAL PRICE

TR2600A - 2mtr
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High Tech
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NEW Ultra-Compact HT XCVRS
TH21AT 2mtr
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ICOM

IC735 NEW General Coverage HF Transceiver Full Featured -Ultra Compact - Economical
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IC-751A New Full Featured HF Transceiver. Top of The Line. Warranty
CALL TODAY FOR LOW TEXAS TOWERS/ICOM PRICE!

IC271A List $699 IC271H List $899
IC471A List $799 IC471H List $1099
CALL TODAY FOR SPECIAL LOW ICOM PRICES!!

IC27A List $369 IC27H List $409
IC37A List $449 IC47A List $469
CALL TODAY FOR SPECIAL ICOM PRICES!

IC3200 NEW 2m/70cm Dual Band Xcvr List $549
CALL FOR SPECIAL PRICE !

IC02AT - 2mtr
IC04AT - 70cm
High Tech
HT XCVRS

IC2AT - 2mtr
IC3AT 220 MHz
IC4AT 440 MHz
ALL IN STOCK—
CALL FOR SPECIAL PRICES!

ASTRON POWER SUPPLIES

Heavy Duty - High Quality - Rugged - Reliable

- Input Voltage: 105-125 VAC Output: 13.8 VDC ± .05V
- Fully Electronically Regulated— 5mV Maximum Ripple
- Current Limiting & Crowbar Protection Circuits
- M-Series With Meter— A-Series Without Meter

Model	'Cont. Amps	iCS Amps	Price
RS4A	3	4	$ 39
RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

YAESU

FT-757GX LIST PRICE $829
CALL FOR SPECIAL SALE PRICE!

FT-726R LIST PRICE $899
CALL FOR SPECIAL SALE PRICE!

FT2700RH NEW 2m/70cm Dual Band Transceiver Full Duplex — Cross Band Operation! List $579
CALL FOR PRICE—SAVE $$!

FT-209RH
NEW High Tech 2mtr HT
5 Watt Output
NOW IN STOCK

CALL FOR YOUR SPECIAL PRICE!

NEW PACKRATT Model PK-64 Packet Controller $219.95

PK-80 Packet Controller	$219.95
CP1-1 Computer Patch	$189.95
CP-1/64 Computer Patch W/C64 MBATEST	$219.95
CP-100 Deluxe Computer Patch	$299.95
PK64 C64 Packet System	$219.95
MBATOR Software C64 or VIC20 (Specify)	$89.95
Doctor DX CW Band Simulator Software	$99.95
Doctor QSO Morse Code Trainer Software	$79.95

Isopole 144MHz, 220MHz & 440MHz Antennas In Stock — CALL FOR SPECIAL PRICES!

MIRAGE AMPLIFIER SALE!

B3016 ONLY $199!

Model	Band	Pre-amp	Input	Output	Sale Price
A1015	6M	Yes	10W	150W	$249
B23S	2M	No	2W	30W	$ 79
B23A	2M	Yes	2W	30W	$ 89
B215	2M	Yes	2W	150W	$259
B108	2M	Yes	10W	80W	$159
B1016	2M	Yes	10W	160W	$249
B3016	2M	Yes	30W	160W	$199
D24	440	No	2W	40W	$179
D1010N	440	No	10W	100W	$289

AMERITRON

AL80A NEW 1000W 3-500Z Amplifier $689
Al-84 600W PEP Output (4-6MJ6 Tubes) $379
RCS-4 4 Pos Remote Antenna Switch $119.95
RCS-8V 5 Pos Remote Antenna Switch . . $119.95
ATR-15 1500W Antenna Tuner $289

TEN-TEC SALE!

NEW CORSAIR II
CALL FOR PRICE AND DELIVERY INFORMATION

425 Titan New 3KW amplifier in stock - Call For Special Price

ALINCO

ELH-230D
LIST $89.95
30 Watt 2M Amp w/Preamp
Special $79.00
Other Alinco Amps in Stock Call For Special Price.

POWER SUPPLIES

EP-3030 LIST $208.00
SPECIAL $189.00

KDK

FM-240
NEW COMPACT
2M-25W FM Transceiver
- 16 memory channels
- 2 VFOs
- Programmable sub audible tone unit included no extra charge.
- Optional voice synthesizer available

Call For Special Price

THL CORP.

Power amps and receive preamps in stock.
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Kantronics

NEW KPC-2 Packet Controller
List $219.00 ONLY $199.95

The Interface	List $169.95	SALE $129.95
Interface II	List $269.95	$SALE $239.95
Universal Term Unit	List $199.95	SALE $189.95
UTU Terminal Software (IBM/CPM/TRS80)		$19.95

FREE SHIPPING-UPS SURFACE (continental USA) (most items, except towers/antennas)

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CIRCLE 22 ON READER SERVICE CARD

Novice

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Ten American Districts Award

The Ten American Districts (TAD) award is in memory of Tadpole (TAD), a Beagle dog who considered himself to be a W6LS club member. Tad liked the sound of code and he spent more time at W6LS than most members. Tad's person was Bill Welsh, W6DDB. Tadpole was the name of the youngest son of our 16th President, Abraham Lincoln. A tadpole is a baby frog (pollywog) with a large tail for a body. Tad Welsh had a tail that he whirled around like an airplane propeller. He was born in 1961 and he died in 1974. Tad was an extremely intelligent animal with real *class*.

The Lockheed E.R.C. Amateur Radio Club (W6LS) is pleased to offer the TAD award to recognize operating achievements. Almost 4000 TAD awards have been issued.

Availability. The TAD award is available to all licensed amateur radio operators and amateur radio clubs.

Requirements. Contacts with all ten (10) American callsign areas must have been made from the same callsign area (such as W4, G2, or VE3). However, all contacts do not have to be from one location in the callsign area.

Hawaii (KH6, etc.) counts as the 6th district and Alaska (KL7, etc.) counts as the 7th district.

Contacts can be to and/or from fixed, mobile, portable, or fixed-portable stations. Contacts count for the callsign area in which they are made.

Cross-band and cross-mode contacts are acceptable.

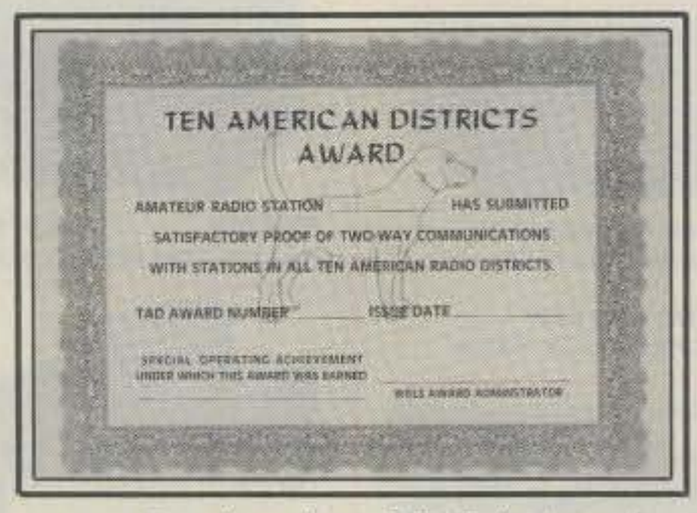
Contacts do not have to be after any beginning date nor before any closing date.

If your callsign has been changed, contacts with your previous callsign are still accepted as long as they were made from the same callsign area. Your present callsign will appear on the award, unless you request otherwise.

Endorsements. Hand-printed endorsements will be added to the award for code, one-band, OSCAR, QCWA, QRP, RTTY, SSTV, YL, 10-X, and any other special operating achievement under which the award is earned. The validation (QSL cards or verified list) must support such special achievement endorsements. Separate TAD awards can be requested for each proven operating achievement.

Cost. Award application must be accompanied by payment in the form of cash,

2814 Empire Ave., Burbank, CA 91504



The Ten American Districts Award.

check, IRCs, or USA stamps as follows:

$1.00 for Canadian, Mexican, and USA amateurs furnishing verified list with no QSLs.

$2.00 for Canadian, Mexican, and USA amateurs requiring return of QSLs.

$2.00 for DX amateurs furnishing verified list with no QSLs.

$3.00 for DX amateurs requiring return of QSLs.

50¢ extra for each separate award requested for a specific operating achievement and mailed with another TAD award.

Validation. Following are the validation requirements.

Cards. It is preferred that we not receive QSL cards, since they are harder to check and could be lost in the mail. If cards are sent, they must include all the information needed to verify your two-way radio contacts. If cards are received, they will be returned in the same envelope with your TAD award.

List. We prefer to receive verified lists instead of QSL cards. The list must show all pertinent information including other station callsign, date, time, mode, and band or frequency. If special endorsements are requested, the list data must indicate that they have been earned. The list must be validated by an elected official (other than the applicant) of an amateur radio club, or two other licensed amateurs. This validation simply indicates that another amateur has seen that the claimed contacts are properly recorded in your station log and/or verified by your received QSL cards. This list is not returned.

Registered Mail. Please do not send award requests by registered mail since we are not normally at the club during the day and registered mail is delayed.

Address. All TAD award requests should be sent to Amateur Radio Station W6LS, 2814 Empire Avenue, Burbank, CA 91504-3297 U.S.A.

Issue Date. TAD awards are almost always issued the 19th day of each month.

Third Party and Reciprocal Operating Agreements

Per the current FCC lists, the United States has third party (T) and/or reciprocal (R) operating agreements with the following countries:

T	R	Country (see notes 1, 2, and 3)
•		Antigua/Barbuda
•	•	Argentina
•	•	Australia
	•	Austria
	•	the Bahamas
	•	Barbados
	•	Belgium
•	•	Belize
•	•	Bolivia
	•	Botswana
•	•	Brazil
•	•	Canada (see note 4)
•	•	Chile
•	•	Colombia
•	•	Costa Rica
•		Cuba
	•	Denmark
•		Dominica
•	•	Dominican Republic
•	•	Ecuador
•	•	El Salvador
	•	Fiji
	•	Finland
	•	France
•		the Gambia
	•	Federal Republic of Germany
•		Ghana
	•	Greece
•	•	Grenada
•	•	Guatemala
•	•	Guyana
•	•	Haiti
•	•	Honduras
	•	Iceland
	•	India
	•	Indonesia
	•	Republic of Ireland
•	•	Israel
	•	Italy
•	•	Jamaica
	•	Japan
•	•	Jordan
	•	Kiribati
	•	Kuwait
•	•	Liberia
	•	Luxembourg
•		Mexico
	•	Monaco
	•	Netherlands
	•	Netherlands Antilles
	•	New Zealand
•	•	Nicaragua
	•	Norway
•	•	Panama
•	•	Paraguay

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Send QSL card for FREE Catalogue

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CIRCLE 67 ON READER SERVICE CARD

New for
KENWOOD TH21AT, 31AT, 41AT
a *Fastcharger*

SPECIAL SALE!

~~$54.95~~

Now $49.95

+ $3.00 shipping and handling
FL res. add 5% sales tax

Save $15.00 when ordering charger with accessories kit.

Features:

- •Charges in 15 minutes
- •Automatic Voltage cut-off
- •Battery doesn't heat-up
- •12v–14vdc input
- •No memory
- •Proven in daily use

Optional AC adapter with DC and mobile cords available ~~$19.95~~ $9.35

Charge-Rite

Call and talk with Paul WB4WIG or Dr. "S", WA4DBV

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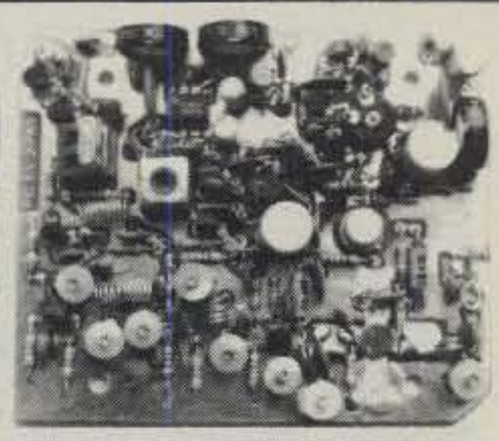

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•	•	Peru
	•	Philippines
	•	Portugal
•		Saint Christopher & Nevis
•	•	Saint Lucia
•		Saint Vincent & the Grenadines
	•	Seychelles
	•	Sierra Leone
	•	Solomon Islands
	•	Republic of South Africa
	•	Spain
	•	Suriname
•		Swaziland
	•	Sweden
•	•	Switzerland (see note 5)
•	•	Trinidad & Tobago
	•	Tuvalu
•	•	United Kingdom (see note 6)
•	•	Uruguay
•	•	Venezuela
	•	Yugoslavia

Notes

(1) We have reciprocal operating agreements with 67 countries. We have third-party traffic agreements with 40 countries. We have both reciproal operating agreements and third-party traffic agreements with 31 countries.

(2) International radio communications must be in plain language. Business messages are prohibited. At the end of each exchange of international third-party traffic, the FCC licensed amateur must transmit the callsigns of the foreign station and his own station.

(3) U.S. citizens are not eligible to obtain an FCC issued reciprocal permit. Aliens are eligible to obtain FCC issued amateur radio licenses. Reciprocal permits are valid a maximum of one year, or to the expiration date of the alien's license, whichever date comes first. FCC Form 610-A is used to apply for a reciprocal operating permit, and a copy of the alien's license must accompany the permit application. The reciprocal operating permit authorizes operating privileges specified by the alien operator's home regulations, but not to exceed the privileges of a U.S.A. Extra class licensee. The reciprocal licensee does not necessarily have full U.S.A. Extra class privileges. As an example, a reciprocal licensee holding the equivalent of an American General class license in her/his home country is restricted to no more than U.S.A. General class privileges.

(4) Americans are allowed to operate in Canada without obtaining a reciprocal operating permit, and vice versa.

(5) Third-party traffic is only permitted with Geneva ITU station 4U1ITU.

(6) Third-party traffic is only permitted with special-events stations having a GB callsign prefix. GB3 stations are excluded from this arrangement.

Computer Contacts

It is becoming increasingly common to have contacts with computers, which leaves me with a cold and empty feeling. I like person-to-person contacts.

Novices using computers to complete contacts are not helping themselves develop reasonable code proficiency in sending and receiving. The equipment probably has excellent capability in handling code. The Novice or Technician using such equipment is likely to remain at a low code proficiency a very long time.

Twenty-year-old Laurent Thomin, FD1JTL, of Olivet, France was one of the ten youngest amateur radio operators in France when he passed the extra class test during September 1984. He worked about 120 countries during his first six months on the air. Laurent also worked all continents on code and voice (SSB) in one day. He also holds an American callsign (KAØTGW), and he operated ARRL Field Day contests from Minnesota in 1984 and 1985. His station includes an FRG-7, plus the FL/FR-101 combination, with a windom antenna. Laurent wants beginning amateurs to know that it is possible to work DXCC (100 countries) with 100 watts and a relatively poor antenna, despite the bad propagation conditions. Get on the air and give it your best effort.

Jennifer Garrison, KA5VWY, of Leesville, Louisiana is an 11-year-old honor-roll student at Vernon Elementary School. Her mother is KA5VWZ and her father is WB5NAA. These three amateurs share usage of the same station; it includes a Kenwood TS-830 transceiver, Hy-Gain TH6-DXX triband Yagi-Uda up 70 feet, plus 40 and 80 meter dipole antennas. Her other interests include jazz/tap dancing, piano playing, softball, and stamp collecting. WB5NAA is helping KA5VWY and KA5VWZ prepare to pass the Technician examination.

I have noticed that several computer buffs use a boiler plate transmission, or series of such transmissions. They either can't or they won't vary these preset texts. Attempts to initiate a two-way conversation go unanswered in such cases. The end of one canned computer transmission was "I hope to work you again soon." My response was that I look forward to the first contact with that station operator. Not one question had been answered during the contact, although I asked several questions. All I received was a pair of preset monologues, neither of which included any comments regarding the conversation points I had attempted to raise. This is common.

There is nothing wrong with using computers and other electronic equipment to augment one's operating enjoyment. However, those of us who operate the Novice bands are usually doing so to help Novices and Technicians increase their code proficiency to the point where they can pass the 13 wpm code test. Please let us help you with person-to-person code contact. The use of sophisticated gear and exotic modes are available to a much greater degree to General, Advanced, and Extra class licensees.

Test Sessions

The American Radio Relay League (ARRL) conducts approximately 60% of the Technician through Extra class tests that are administered nationwide under the Volunteer Examiner Coordinator (VEC) Program. The ARRL offers a free printout of all test sessions scheduled through its ARRL/VEC Program. This list is updated daily. Simply tell which state (or states) in which you are likely to take a test. Enclose a business-size (number 10) self-addressed, stamped envelope. Such request should be addressed to ARRL/VEC Test Sessions, 225 Main Street, Newington, CT 06111.

The April and May 1985 Novice columns provide a detailed explanation of the overall volunteer examination program, covering Novice through Extra class examinations. Previous issues are usually available at a cost of $2.50 each from *CQ*, 76 N. Broadway, Hicksville, NY 11801.

Entering the fourth quarter of 1985, the American amateur radio operator census was 76,337 Novices (18.5%), 83,117 Technicians (20%), 117,340 Generals (28%), 97,825 Advanced (24%), and 37,968 Extra (9%) class licensees. Licensees increased by 2521 (0.6%) during the year.

Photographs Wanted

Photographs of Novices in their shacks provide introductions to a few of the newer amateurs. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year *CQ* subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest *CQ* issue. One award is made each month, no matter how many photographs are printed. DX amateurs, who frequently work the American Novice bands, are also urged to submit photographs.

73, Bill, W6DDB

Awards

a monthly feature by
DOROTHY H. JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month is:

Aubrey G. Armstrong, K5MOF All Counties #382, 6-1-82

"I was first licensed as a Novice, KN5MOF, on September 26, 1957. On June 25, 1958 I received my license as a Technician, and on July 7, 1958 I upgraded again to General class.

"Originally I worked the 40 meter Novice band with the single 807 and gradually built up my QSL card file with contacts.

"After I got my General class license I continued to operate on 40 meters. During the early part of 1965 I began reading *CQ* magazine and read about the USA-CA program. Since I was in an administration position with the Air Force, I managed to work the local postal authorities out of a Post Office Directory #26 and I started to catalogue my cards. I found that I had over 500 counties, so I sent in my application. My USA-CA 500 was issued in February 1965.

"I kept working on collecting the counties but didn't get very far at that time. My work and my family required most of my time.

"I was in charge of the special events station 'W5SC' which operated at the World's Fair from April to October 1968. We earned USA-CA 500 #700 for W5SC at that time.

"Meantime, I had rig trouble and was working long hours at a new job, so I was off the air for a while.

"I retired as a civilian employee of the United States Air Force on May 30, 1970 after 30 years of service at Kelly Air Force Base.

"I went to work for the Government Employees Credit Union on June 1, 1970 and worked there until January 12, 1980 when I retired for a second time. I had no working rig so I bought a 2 meter rig and got on the air until I was able to get a working rig on HF, which occurred in December 1980. At that time I started monitoring 14.336 almost continuously until May 23, 1982 when Dave, W7NXZ, drove almost up to the Canadian line to get my last county.

"I am married. My wife, Ermine, and I have three daughters, one son, and nine grandchildren, and in October 1985 we became great grandparents.

"Although I do not plan to work all the counties the second time, I do plan to go on 14.336 for a contact every once in a while.

"I attended the annual County Hunters Convention in San Diego in 1982, the one in Kansas City in 1984, and hope to go to North Carolina this year.

"I was 69 years old on October 18, 1985.

"I have never operated a mobile station on 20 meters, but hope to do so some day. 73, Aubrey, K5MOF"

333 South Lincoln Ave., Mundelein, IL 60060

Aubrey G. Armstrong, K5MOG, USA-CA All Counties #382, 6-1-82.

Awards Issued

Le Roy Ullrich, WA0LMK, worked and confirmed his last few counties to claim USA-CA All Counties #504, 2-5-86, Mixed.

Robert E. March, VE7OR, completed all the paperwork to qualify for USA-CA 500 #2091, USA-CA 1000 #916, USA-CA 1500 #738, USA-CA 2000 #659, USA-CA 2500 #602, USA-CA 3000 #537, all 20 M, SSB, Mobile and USA-CA All Counties #505, Mixed, all dated 2-5-86.

George W. Lee, K5HT, sent for USA-CA 3000 #538 and USA-CA All Counties #506, All SSB, 2-28-86.

Joe M. Chambers, KF5AT, earned another seal for his certificate and now has USA-CA 1500 #739, Mixed, 2-26-86.

USA-CA 500 certificates went to:

James F. Baker, W5OHF, USA-CA 500 #2086, All SSB, 2-3-86.

Takashi Hashimoto, JG1NBD, USA-CA 500 #2087, All 28 MHz CW and All 28 MHz SSB. These two endorsements run concurrently, and this is the first certificate to be so endorsed.

Betty Pearl Cruz, SWL-W6, USA-CA 500 #2088, 2-6-86, Mixed.

Frank A. Strickland, WO4I, USA-CA 500 #2089, 2-11-86, Mixed.

Des Moines Radio Amateur Association, W0AK, Des Moines, Iowa, USA-CA 500 #2090, 2-12-86, All Mobile.

Robert E. March, VE7OR, USA-CA 500 #2091, 2-22-86, All 20M, Mobile, SSB.

USC-CA Special Honor Roll

Le Roy Ullrich, WA0LMK
All Counties #504, 2-5-86

Robert E. March, VE7OR
All Counties #505, 2-22-86

George W. Lee, K5HT
All Counties #506, 2-28-86
All SSB

Awards Available

Five Argentine Islands Award. This award is issued by the CW Groupe of Argentine (GACW) for all radio amateurs who have two-way communications with five different Argentine stations in islands including three of them valid for DXCC.

Valid contacts must be after March 30, 1927, which is the date of the first CW transmission from the Argentine station LRT in South Orkney Island.

The Cinco Islas Argentinas Award, offered by the Grupo Argentino de CW.

DXCC example: LU-Z, Malvinas Island; LU-Z, South Shetland; LU-Z San Pedro Island (South Georgia) LU-Z, South Sandwich Island; LU-Z South Orkney Island and all the Antarctic islands.

Non-DXCC example: LU-X, Staten Island; LU-X, Pavon Island; LU-X, Tierra del Fuego Island; LU-X, Becasses Island and all oceanics islands.

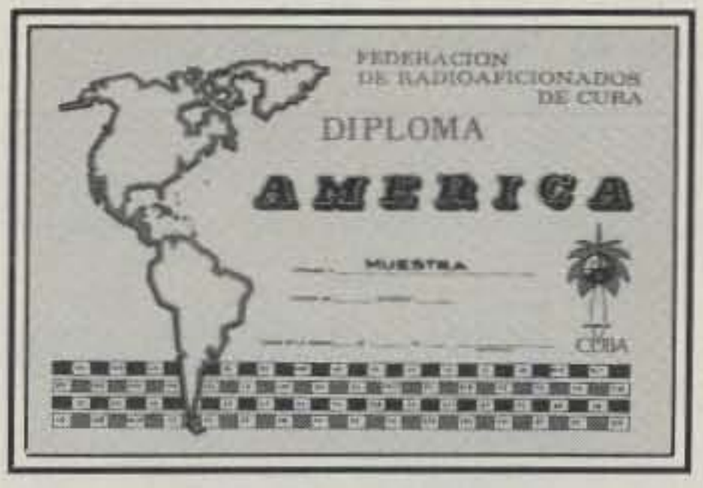
Say You Saw It In CQ

USA-CA Honor Roll

3000		1500		500	
VE7OR	537	VE7OR	738	W5OHF	2086
K5HT	538	KF5AT	739	JG1NBD	2087
				SWL-W6	2088
2500				WO4I	2089
VE7OR	602	1000		W0AK	2090
		VE7OR	916	VE7OR	2091
2000					
VE7OR	659				

Mode: A1A (CW). Fee: 10 IRC's. Application: Send logs with call, date, band, report, and photocopies of the QSL cards to: CW Group of Argentine (GACW), Carlos Diehl 2025, 1854 Longchamp Buenos Aires, Republic of Argentina.

The America Award. Work 45, 50, or more countries and islands in the American continent. To qualify for Class III, work 45; for Class II, work 50; and for Class I, work more than 50. Cuba must be one of the countries. The KG4 prefix, Guantanimo Bay, does not count.



The Diploma America, which is sponsored by the Federacion de Radioaficionados de Cuba.

No QSL cards need be sent. Send a copy of the log with contents certified by an affiliated radio club or two active hams. Send application with fee of 10 IRC's or $2.00 US to: President FRC (G. DX C.), P.O. Box 1, Havana 1, Cuba. The award is free of charge to members of the Cuba DX Group or to any amateur radio organizations.

Worked The Equator Award. The Worked the Equator Award (WTEA/SWL-WTEA) is available to licensed amateurs the world over. It is issued for confirmed contacts with, or having heard from, countries according to ARRL DXCC country list along the equator as follows: C2, HC, HC8, HK,

Worked the Equator Award from Organisasi Amatir Radio Indonesia.

Grupo de CW do Rio de Janeiro (CWRJ) members and friends, all PY1.

KH1 & KB6, PP-PY, PY0 (St. Peter), S9 (Sao Tome), T30, T31, T32, TN, TR, YB5, YB7, YB8, 5X, 5Z, 60, 8Q, 9Q. The WTEA (SWL-WTEA) will be issued in three classes:

Class I—for confirmed contact with, or having heard from, 15 countries.

Class II—for confirmed contact with, or having heard from, 12 countries.

Class III—for confirmed contact with, or having heard from, 8 countries.

For all classes, contact with or having heard from YB5, YB7, and YB8 is obligatory.

To apply, send your log extracts (GCR) in alphabetical order by prefix along with the award fee (in money order or IRC's) of $8.00 US or 16 IRC's to: Mr. Ben S. Samsu, YC0EBS, P.O. Box 96, Jakarta 10002, Indonesia.

Worked All Indonesia Award (WAIA/SWL—WAIA). The Worked All Indonesia Award (WAIA/SWL-WAIA) is available to licensed amateurs the world over. It is issued for confirmed contact with, or having heard from, stations in each of the Indonesian call areas (1 to 0) under the following requirements:

2.1. DX stations other than those in *CQ* zone 28 need confirmed contacts with, or having heard from, 2 stations from each call area, a total of 20 QSL cards.

2.2. DX stations in zone 28 need confirmed contacts with, or having heard from, 3 stations from each call area, a total of 30 QSL cards.

2.3. Indonesian amateurs need confirmed contacts with, or having heard from, 5 stations from each call area, a total of 50 QSL cards. Contacts with, or

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	#9140—40M	#9120—20M	#9110—10M
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	#081 Vert./Horiz. Bar mount		$8.95
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CIRCLE 11 ON READER SERVICE CARD

The Worked All Indonesia Award sponsored by the Organisasi Amarie Radio Indonesia.

having heard from, 3 different stations class (YB, YC, YD) in the same call area is a must.

2.4. To apply, send the log extracts (GCR), in alphabetical order by prefix, along with the award fee of $8.00 US or 16 IRC's to: Mr. M. Maruto, YBØTK, P.O. Box 96, Jakarta 10002, Indonesia.

The Duna-Kanyar (Danubian Bend) Award offered by The Hungarian Radioamateur Society.

The Duna-Kanyar Diploma. This award is offered by the Hungarian Radioamateur Society for confirmed QSO's with HA/HG7 stations after January 1, 1970. The applicant must confirm:

EU stations—20 HA/HG7 QSO's or SWL confirmations.

DX stations—5 HA/HG7 QSO's or SWL confirmations.

Send application with fee of 10 IRC's to: Hungarian Radioamateur Society, Award Committee, P.O. Box 22, Tiszakecske, Hungary, H-6061.

Notes

Once again we welcome June, when the roses bloom in northern Illinois and winter is only a memory! I hope your summer holidays are off to a good start and things are going well where you are. Do you need a copy of the USA-CA Rules and Program with the change made on April 2, 1985? If so, let me know. See you again next month.

73, Dorothy, WB9RCY

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

We are aware of the fact that there has been a delay in getting some of the World-Wide DX Contest trophies to the winners, and we are desperately trying to correct this problem. In many cases it has been caused by the lack of correct shipping instructions. In the case of multi and expedition awards, the lack of identification as to where the plaque should be sent sometimes also presents a problem.

After having some plaques returned with the notation "party unknown" or "incorrect address," it was decided not to send any awards unless we have a confirmation of a correct address. Incidentally, those which go to a stateside address are shipped UPS unless we are notified otherwise.

If you still have not received your trophy, it might be due to the above-mentioned problem. Contact me, give all the necessary details, including the correct shipping address, and we will check out the problem.

Where possible, we like to have trophies presented at one of the larger conventions. With the cooperation of Jim Neiger, N6TJ, and the Southern California DX Club, we were able to send a total of 15 plaques for presentation at Visalia last April.

Inquiries for any potential sponsors of CQ WW DX Contest awards should also be directed to me. Information about WPX Contest awards, however, should go to Steve Bolia, N8BJQ (*c/o CQ* magazine); 160 Contest to Don McClenon, N4IN; and VHF Contest to Steve Katz, WB2WIK.

At present we have an opening for Canada, Single Operator, All Band Phone for the WW DX Contest. After 20 years Jack Baldwin, VE7RG, has phased out his sponsorship. (Many thanks for your support, Jack.) The donor preferably should be a Canadian.

A final reminder: Mailing deadline for logs in our recent WPX CW Contest is July 10th, and they must be sent to *CQ* Magazine, WPX CW Contest, 76 North Broadway, Hicksville, NY 11801.

Another important deadline is for announcements for this column: June 15th for the September issue and July 15th for the October issue to my home address, of course. 73, for this time, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

†	**May**	**24-25**	**CQ WW WPX CW Contest**
*	May	27-28	CLARA AC/DC "Mystery"
*	My31	Jn-1	National 6 Meter Contest
	June	7	YLRL Novice/Tech. Day
	June	7-8	ARRL VHF QSO Party
	June	7-8	RSGB National Field Day
	June	14-15	So. American CW Contest
	June	14-15	All Asian Phone Contest
	June	21-22	NINE Land CW QSO Party
	June	28-29	ARRL Field Day
	July	1	Canada Day Contest
	July	4-5	Clinton ARC Special Event
	July	5-6	Venezuelan SSB Contest
	July	12-13	IARU HF Championship
	July	**19-20**	**CQ VHF WPX Contest**
	July	26-27	"Armadillo CW Run"
	July	26-27	Venezuelan CW Contest
	July	26-28	MARAC County Hunters CW
	Aug.	9-10	European CW Contest
	Aug.	16-17	New Mexico QSO Party
	Aug.	23-24	All Asian CW Contest
	Sep.	3-5	YLRL "Howdy Days"
	Sep.	13-14	European Phone Contest
	Sep.	20-21	Scandinavian CW Activity
	Sep.	27-28	Scandinavian SSB Activity
	Oct.	4-5	IRSA World Championship
	Oct.	15-17	YLRL Anniv. CW Party
	Oct.	**25-26**	**CQ WW DX Phone Contest**
	Oct.	29-31	YLRL Anniv. SSB Party
	Nov.	8-9	European RTTY Contest
	Nov.	**29-30**	**CQ WW DX CW Contest**

† *See January issue.*
* *Covered last month.*

YLRL Novice/Technician Day

1700Z to 2100Z Saturday, June 7

This is a new one organized by the Young Ladies Radio League to promote activity in the Novice bands. It is open to all licensed women operators throughout the world.

Exchange: RST, name, QTH, and license class.

Scoring: Three points for each YL Novice/Tech., 2 points for each General or Advanced, and 1 point for each Extra class YL worked. Total QSO points is your final score.

Frequencies: 3730, 7130, 21130, and 28130, ±10 kHz of each Novice band.

Operation, of course, will be on CW. A station may be contacted once only for scoring credit, and power is limited to 200 watts.

Awards: To the top-scoring Novice/Tech. and General class and higher YL in the form of YLRL postcards.

Logs must be printed or typed (no carbons), and be sure to indicate your license class and sign your log.

Entries must be received by July 7th and go to: Mary Lou Brown, NM7N, 504 Channel View Drive, Anacortes, WA 98221.

RSGB National Field Day

1500 to 1500Z Sat.–Sun., June 7–8

Activity for this CW-only Field Day is not confined to Great Britain. You will also hear some portable activity out of Germany and Switzerland.

Although overseas stations are not directly eligible, they are invited to participate and submit a report of the stations worked.

A certificate will be awarded to the overseas station in each continent that shows the most contacts. Send your logs to: RSGB HF Contest Committee, c/o Mr. D.J. Lawley, 220 Shipbourne Road, Tonbridge, Kent, TN10 3EL, England.

ARRL VHF Contest

1800–0300Z Sat.–Mon., June 7–8

Action will be found on the 50, 144, 220, and 420 MHz bands, and even higher up in the spectrum.

The scoring varies with the different bands used, and there are certain requirements and restrictions in the rules. Working WAS on 6 meters is a possibility. Complete rules will be found in the May issue of *QST*.

I strongly recommend that you write to ARRL Headquarters for official forms. Include an SASE with your request to: ARRL VHF Contest, 225 Main St., Newington, CT 06111.

South American CW Contest

1500Z Sat. to 1500Z Sun., June 14–15

Sponsored by *Electronica Popular* magazine of Brazil, and supervised by the Grupo Argentino de CW of Buenos Aires, this is an annual affair the second weekend of June.

It's still a CW contest only, but the format and scoring have been changed. Now you can work stations in other continents as well as South Americans. Use all 6 bands, 1.8 through 28 MHz.

Classes: Single operator both single and all band, multi-operator, single transmitter, all band only and SWL.

Exchange: RST plus a QSO number starting with 001.

Points: Contacts with stations in own country zero points but okay for multiplier credit. Other countries but same continent, 2 points. Countries in other continents, 4 points. Contacts with South American stations, 8 points. (For stations outside of S.A.)

Multiplier: Different countries (DXCC

list) plus the different South American prefixes worked on each band.

Final Score: Total QSO points times the sum total multipliers from each band.

Awards: Certificates to the three top-scoring stations in each country in each class.

Use a separate log sheet for each band and a summary sheet showing the scoring and other essential information. Include an SAE and one IRC for a copy of results.

Logs must be received no later than August 31st and go to: WWSA Contest Committee, P.O. Box 18003, 20772 Rio de Janeiro, RJ, Brasil.

All Asian DX Contest

Phone: June 14–15 C.W.: Aug. 23–24
0000Z Sat. to 2400Z Sun.

This is the 27th year of this activity sponsored by the JARL. The exchange is between Asian countries and the rest of the world.

Classifications: Single operator, both single and all band. Multi-operator, both single and multi-transmitter, all band only (one signal per band only).

Club stations are classified as multi-operator and each operator will give his age in the exchange.

Exchange: For OM's—RS(T) plus age of operator. For YL's—RS(T) and 00.

Scoring: 3 points for contacts on 160; 2 points for contacts on 80; 1 point on all other bands. (KA contacts do not count.)

Multiplier: For Asians the multiplier is determined by the number of different countries worked on each band (DXCC list). For non-Asians it is determined by the number of different Asian prefixes worked on each band (*CQ* WPX list).

Final Score: Total QSO points from all bands times the sum of the multiplier from each band.

Keep in mind that non-Asians use Asian prefixes as their multiplier, not countries.

Note: JD1 stations on Ogasawara (Bonin and Volcano) are in Asia, and JD1 stations on Minamitori Shima (Marcus) are in Oceania.

Awards: Certificates to the top scorers, both phone and CW, in each country and each U.S. call area. In each class, both single band and all band, up to the fifth rank, depending on the number of returns. Medals to the all-band continental leaders, both single and multi-operator.

Logs: Keep all times in GMT. Use a separate column for the country or prefix multiplier, and fill in only the first time it is worked. Use a separate log for each band. Include a summary sheet showing the scoring and other information, and a signed declaration that all rules and regulations have been observed.

There is a strict disqualification clause for taking credit for duplicate contacts in excess of 2% of the total on each band, as well as other infractions.

Logs must be received no later than Sept. 30th for the Phone section, and Nov. 30th for the CW section. They go to: JARL Contest Committee, P.O. Box 377, Tokyo Central, Japan.

Asian Country List: A4; A5; A6; A7; A9; AP; BV; BY; CR9; EP; HL/HM; HS; HZ/7Z; JA-JR; JD1; JT; JY; OD; S2, TA; UA/UK/UV/UW9-0; UD6; UK6C, D, K; UF6/UK6F, O, Q, V; UG/UK6G; UH8/UK8H; UI8/UK8A, G, I, L, O, T, Z; UJ8/UK8J, R; UL7/UK7; UM8/UK8M, N; VS6; VS9M/8Q; VU; VU (Andaman & Nicobar); VU (Laccadive); XU; XV/3W; XW; XZ; YA; YI; YK; ZC4/5B4; IS (Spratly); 4S; 4W; 4X/4Z; 70 (S. Yemen); 70 (Kamaran); 8Z4; 9K; 9M2; 9N; 9V; (Abu Ail).

1985 WAEDC Contest North America Results

CW

U.S.A.

K1ZM	**819,868**
K1GQ	**775,530**
K1RX	**662,501** (Opr. KZ2S)
W3GM	**368,970**
K1XM	229,835
K3WW	196,474
WC4E	**124,696**
W1PH	118,560
W9RE	**105,000**
K5KLA	**84,455**
W4BV	**68,391**
K2POF	**66,204**
KQ1F	50,830
N6AV/4	47,060
K5NW	45,360
KW2J	42,000
N8BC	**41,856**
W3ARK	41,208
K4BAI	30,960
K2LE	28,830
N6ND	**25,066**
KE9U	24,820
KT1O	20,970
KE0Y	18,422
KD2HE	17,658
W4YN	14,328
W6BIP	13,158
W2DW	13,158
K4FPF	10,854
W5FO	10,464
K6EID	10,176
W1KQ	9,585
W2GHZ	8,802
N6EK/1	7,070
W9AG	6,174
NG0T	5,628
W4KMS	4,692
K4FW/8	3,519
K2PF	3,358
W5EU	3,239
W4KO	3,180
W4KM	2,212
AC8W	2,178
KC1F	2,145
NE4I	2,091
K7LXC	1,768
W1CNU	1,650
KA4QVF	1,482
W1OPJ	858
K6VL	810
N6AW/m	612
KA7FEF	352
WA7KLK	336
W5NR	256

Multi-Op. U.S.A.

K1AR	**353,481**
N2WK	**55,920**
W3AKD/3	**15,336**

Canada

XO1AW	**128,128**
VE3ST	**27,126**
VA1CBF	2,318
VE3PEH	660

Multi-Op. Canada

VE3HQV	4,617

Costa Rica

TI9RC	**15,604**

Dom. Rep.

HI0A	6,952

Panama

HP1AC	8,911

SSB

U.S.A.

K1ZM	**505,336**
AK1A	**346,704**
WC4E	47,690
WI4K	41,984
N4BS	19,140
K2QF	18,900
KA1DWX	18,525
W9RE	10,780
K6EID	9,558
KC1F	8,532
WK4F	8,241
W2DW	7,581
N6AW	6,816
K4BAI	5,712
KA1DSQ	3,680
N2FCH	2,240
KB0U	1,760
WD8QVD	1,664
WA5IYX	234

Multi-Op. U.S.A.

N1AU	**37,760**

Canada

VE3XN	**89,718**
VE1BCF	73,544
VE8RCS	11,520

Dom. Rep.

HI8A	**16,740**

Panama

HP1XKR	6

**Boldface indicates certificate winners.*

NINE Land C.W. Contest

1700Z Sat. to 1700Z Sun., June 21–22

This is the fourth annual contest organized by the Joliet ARS in which there is no limit to whom you can work; however, contact with NINE Land stations (Ill., Ind., and Wisc.) have double QSO point value. Only one contact per band with the same station permitted.

Classes: Single and multi-operator, one transmitter and portable field operation, multi-operator maximum of two transmitters.

Exchange: Consecutive QSO numbers beginning with 001, and state, VE province, or DX country.

Scoring: Contacts with NINE Land stations count 2 points; with all other stations 1 point.

Multiplier: Number of states, VE provinces, and DX countries worked (counted once only). There is a bonus multiplier of 1 for each 20 NINE Land stations worked.

Final Score: Total QSO points from all bands times the number of states, provinces, DX countries, and bonus points worked.

Frequencies: 1805 and 60 kHz up from lower edge of 10 through 80 meters (no 30 meters). Novice: 25 kHz up from low edge of their bands.

Awards: Certificates to high scorers in each class in each state, VE province, and DX country. Plaques to high scorer in NINE Land and outside NINE Land.

Dupe sheets are required for entries with over 200 contacts, and a summary sheet showing the scoring, etc. Include a large SASE for a copy of the results.

Mailing deadline is July 31st to: Joliet ARS, Att.: Paula Franke, WB9TBU, P.O. Box 873, Beecher, IL 60401.

N9AW and K8CW were the 1985 Contest plaque winners.

ARRL Field Day

1800–2100Z Sat.–Sun., June 28–29

Without a doubt, this activity generates more stateside participation in manpower than any other amateur radio activity. It is mostly a club-organized activity, and therefore requires that the coordinator be knowledgeable about what is required.

Entries are separated into many classes. Rules and requirements are quite extensive and will be found in the May issue of *QST*. It is advisable that you read them thoroughly.

Official log forms are a must. Direct your request with a large SASE to the ARRL, ARRL Field Day, 225 Main St., Newington, CT 06111.

Say You Saw It In CQ

Canada Day Contest

0000 to 2400Z Tues., July 1

Again sponsored by the Canadian Amateur Radio Federation, this contest follows the same pattern as the Canada Day Contest last December.

Activity will be on all bands, 2 through 160 meters, phone and CW. Single operator, single and all band, multi-operator all band only.

The same station may be worked on each band and each mode for QSO and multiplier credit.

Exchange: RS(T) and QSO number starting with 001, and province.

Scoring: 10 points for each contact with Canada, 4 points if with others, and 20 bonus points for each contact with any CARF official news station using the suffix TCA or VCA.

Multiplier: Number of VE provinces/territories worked on each band and mode. Total of 26—13 on CW and 13 on phone. Contacts with stations outside of Canada count for QSO points no multiplier.

Frequencies: 1810, 1840, 3525, 3775, 7025, 7070, 7155, 14025, 14150, 21025, 21250, 28025, 28500, 50040, 50110, 144090, 146520.

Awards: Certificates to the top-scoring entries in each class, in each VE prov./terr., U.S. call area, and DX country. Trophies to single operator, all band, and multi-operator winners.

Include a summary sheet with your log showing the scoring, etc., and a dupe sheet. Official log forms are available.

Mailing deadline is July 31st to: CARF Contest, c/o N. Waltho, VE6VW, P.O. Box 1890, Morinville, AB, T0G 1P0 Canada.

Clinton ARC Special Event

The Clinton, Iowa Amateur Radio Club will operate a special event station, W0CS, on July 4th and 5th to commemorate the 25th anniversary of the Clinton Riverboat Days.

Activity will be found on: CW—3720, 7120, 21120. SSB—3720, 7275, 14275, 21375. Two Meter FM—146.460. SSB and CW—144.210.

Send your QSL's and an SASE to: Darryl Petersen, KD0PY, RR #1, Box 84, Bryant, IA 52727. This will get you a certificate.

Venezuelan Contest

Phone: July 5–6 C.W.: July 26–27
0000Z Saturday to 2400Z Sunday

This is the 24th yearly contest celebrating Venezuela's independence. It's a world-wide type contest; therefore, do not confine your activity to working YV's only. Use all six bands, 10 through 160 meters. There are four classes: Single operator, single and all band, and multi-operator single and multi-transmitter.

Exchange: RS(T) plus a QSO number starting with 001.

Points: Contacts between stations in different countries, 2 points. Between stations in the same country zero (0), but permitted for multiplier credit.

Multiplier: One for each YV call area, each U.S. call area, and each country (including own) worked on each band.

Final Score: Total QSO points from all bands multiplied by the sum of the multiplier from each band.

Awards: A plaque to the highest scorer in each class. Medals to the highest scoring single operator in each continent and the Bolivarian countries (Bolivia, Colombia, Ecuador, Panama, Peru).

Certificates to stations in the Americas working 15 YV stations and 10 different countries; European and African stations working 10 YV's and 10 countries; and Asia and Oceania stations working 5 YV's and 10 countries.

Use a separate log sheet for each band, and a summary sheet showing the scoring, your name and address in block letters, and the usual signed declaration. It is requested that all award applicants include a remittance of $2.00 or its equivalent in IRC's.

Mailing deadline is August 15th for phone entries and September 15th for CW. They go to: Radio Club Venezolano, P.O. Box 2285, Caracas 1010-A Venezuela.

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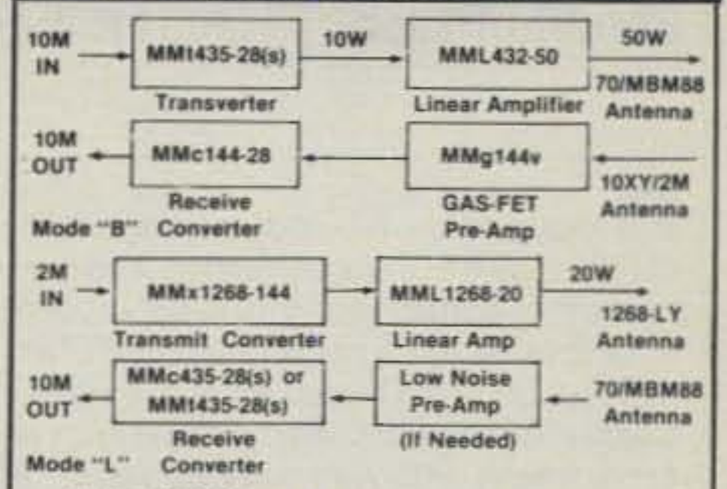

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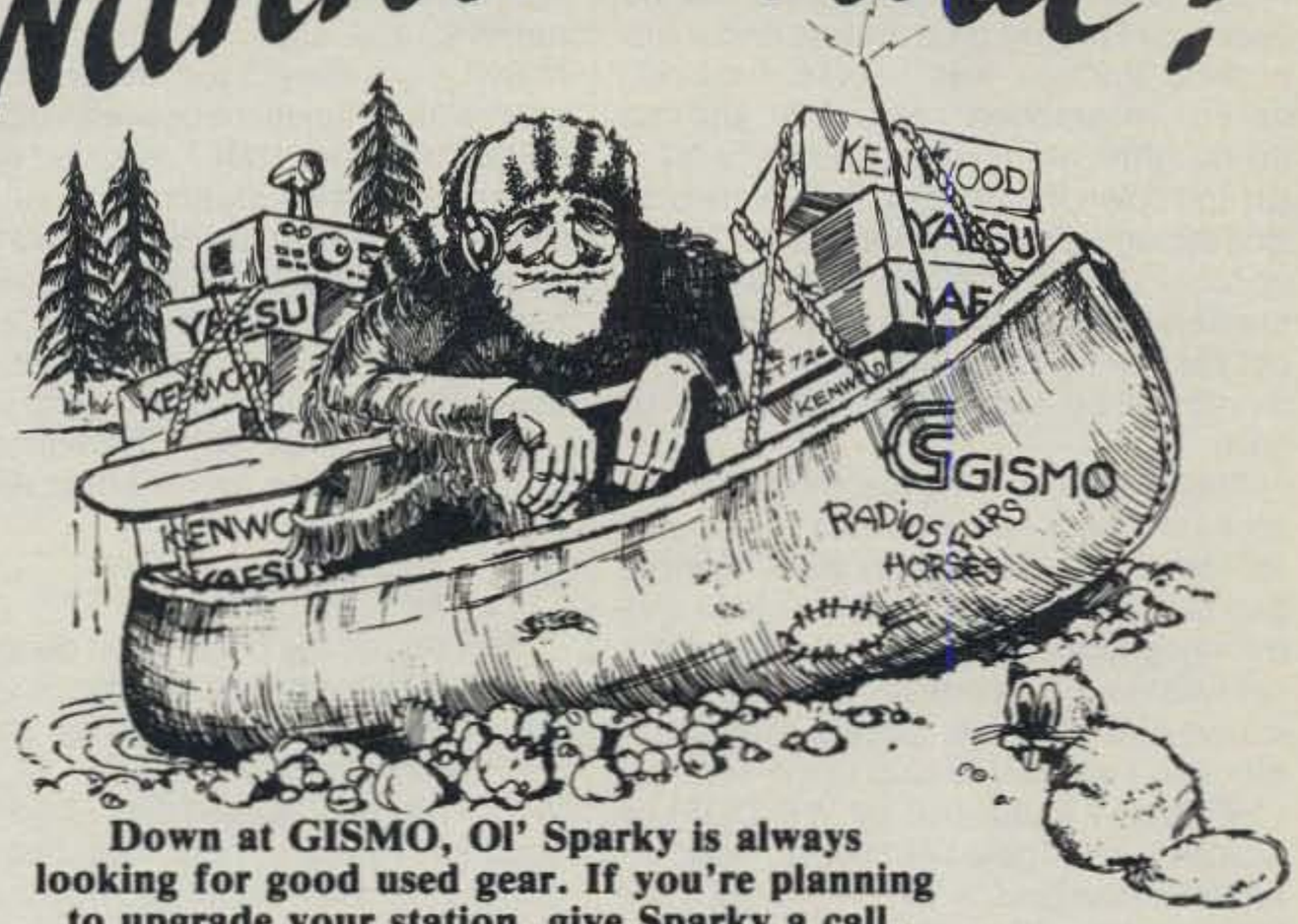

Down at GISMO, Ol' Sparky is always looking for good used gear. If you're planning to upgrade your station, give Sparky a call. Your present equipment may be worth plenty.

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VHF

a monthly feature by
STEVE KATZ, WB2WIK

PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER

More Aurora

Reports on the fabulous aurora session of February 8 are still coming in, and it appears that numerous auroral DX records were broken. Al Olcott, K7ICW, had a two-page report in the March issue of the *West Coast VHF'er* (published by WA6IJZ) on his experiences with Au from Las Vegas. Al said he's only seen four examples of VHF Au over the past 19 years (!), with the first being on May 25, 1967 and the last—and best—being February 8, 1986. Al relates: "At 0118 on Feb. 9, WWV was sending 98/110/9. The *K* index of 9 is the highest I have ever heard. During this opening I had a chance to play with the antenna, since the few signals that I worked and heard were busy. I found that elevating the antenna here did no good . . . the aurora cloud had a horizon spread 045 to 345 degrees, shifting back and forth . . . at several points, little or no aurora reflection was noted with a direct north beam heading! In fact, at one point, signals peaked with two different beam headings." Al worked W5SUS (AR) over a distance of 1200 miles on 144 MHz. This from a station at 36 degrees N latitude!

Also in the *West Coast VHFer* was a report from Keith Thompson, K6PVS: On Feb. 8th, "I had just awakened from a nap and had turned on the 6 meter rig to see if anything was coming through; well, there was KH6IAA 40 over 9 off the back of the beam . . . I turned on 2 meters and there buzzing through was WØVM. I quickly called him, grabbed the card file, and had my daughter start making phone calls . . . Up and down the band stations were buzzing through, down as low as (144).120 and up to .225; I knew the opening must be incredible to the east if stations were spread out that far . . It had been 3 years and 5 months since aurora was last observed here . . ."

This auroral opening really knocked our socks off, folks. As reported in this column for May, I was plenty busy working three bands at once, doing what I could to give out my grid and state to the newcomers out west and down south. Meanwhile the midwesterners were busy breaking DX records. The March issue of the *Midwest VHF Report* (published by WBØDGF) indicates that the new 144 MHz Au world DX record is now held by WAØTKJ/KA1ZE and WBØDRL/KA1ZE, both contacts measuring 1348 miles. Other noteworthy contacts included K5SW/W1VD at 1273 miles, KØTLM/WA1VTA at 1214 miles, K5YY/W1VD at 1208 miles, and W5FF/K9MRI at 1200 miles.

Also according to the *Midwest VHF Report*, new 220 and 432 MHz Au DX claims include WAØTKJ/W3IY at 1093 miles on 220 and WB5LUA/W3IP at 1181 miles on 432. An incredible contact was reported (via W1JR) between WA7KYM, running just 10 watts output, and KØUS—450 miles on 432 MHz. Other recent records of note (not related to the February aurora) are the new North American 2.3 GHz (SHF) record set by WB5LUA/W4ODW (624 miles) and the new world's 3.3 GHz DX record of 1170 miles set by VK6WG and VK5QR.

The March issue of the *S.W.O.T. Newsletter* contained a plea from Emil Pocock, W3EP. Emil is requesting that stations active during the February 8–9 auroral session please send photocopies of their logs to him for his preparation of a full report on the aurora. He is especially interested in knowing of any 23 cm Au contacts, since none have ever been reported. Emil's address is 517 Rutherford St., Athens, GA 30606.

I received a great letter from Allen, KA3NTX, who is studying at Michigan Techological University and operates club station W8YY there. Allen reports on the "great amount of aurora activity" February 9, and says that his friend Jim, KØBFT, witnessed a "beautiful visual aurora" in Minnesota between 0230 and 0500Z that date. KØBFT reported working 21 stations in 14 grids and 7 states using a TS700A, 80 watt amp and a Jr. Boomer antenna. Club station W8YY successfully completed several Au QSO's on SSB while running just 10 watts outout to a 20-element "twist" antenna. Grid searchers, take note that W8YY is in rather rare grid EN57. Thanks for the letter, Allen.

Pings and Things

Remember the photos and description of W5UN's 2 meter moonbounce station? Dave has some new information about his EME work updated March 10, 1986: W5UN has now worked over 500 different stations in 54 countries, 50 states, and all continents via 144 MHz moonbounce. Several small stations have been worked off the moon recently: among them, at least five are known to have been using single Yagi antennas and running 150 watts output power. These "minimum" EME stations are K2GAL, KMØA, VE5LY, KE2N, and W2RS. Other "single Yagi" (but higher powered) stations worked include KR9U, HG8ET, KØGJX, and WB2WIK (yawn). Dave would like to reiterate that he operates 144.008 MHz and enjoys working non-EME-equipped stations at their moonrise or moonset. He would be happy to schedule any station desirous of working TX or making their first moonbounce contact. Dave's telephone number is (713) 331-4200; you can write to him at 9102 Kings Dr., Manvel, TX 77578.

Anybody out there on 70 cm ATV? At this writing (late March) I just picked up a new Microwave Modules MMC435/600 ATV receive converter to enjoy some home viewing until I can complete my ATV station. The tiny MMC unit—a palm-size affair which can be installed and operational in about 30 seconds—seems to work pretty well, but since it is essentially a "block" converter, high-level RF at frequencies outside the amateur ATV band are also converted, making for some initial confusion. I intend to pick up the mating Microwave Modules 20 watt ATV transmitter shortly, and should have an operational ATV station by the time this reaches print. Only after I'm active on this mode shall I write a bit about it. I try not to discuss things which are unfamiliar because I don't like the taste of "foot."

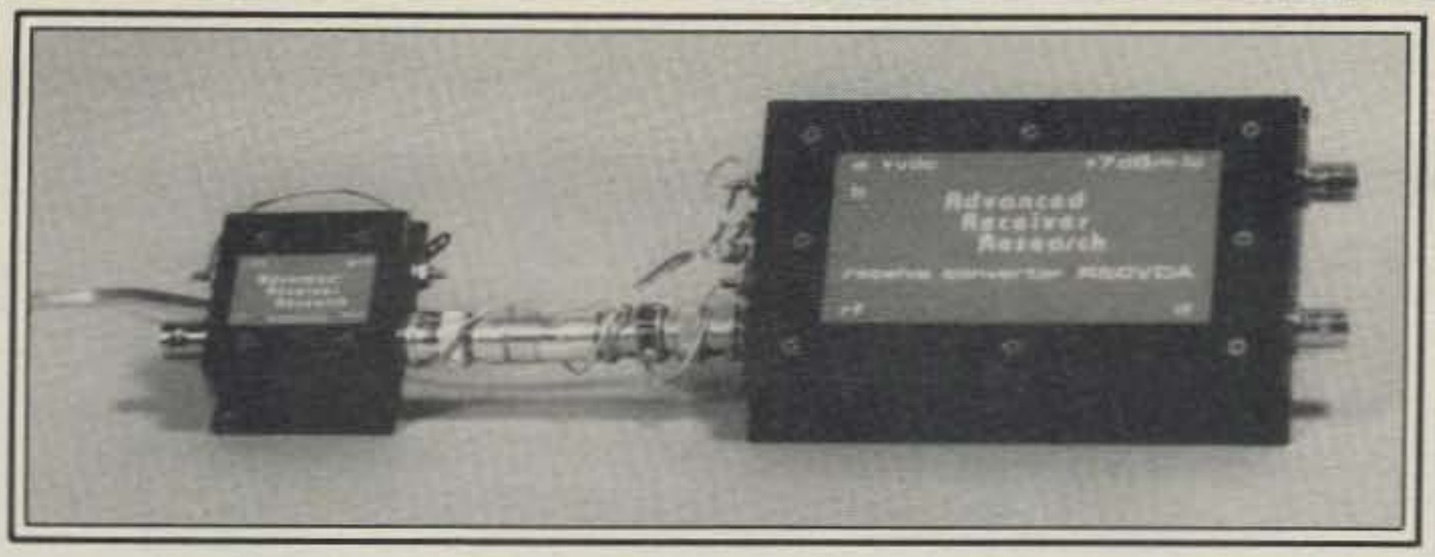
Speaking of feet, why not put yours to some good use by getting out to operate the *CQ* VHF WPX Contest next month? The formal announcement of our second annual operating event was on page 48 of the April *CQ*, and this June issue contains some tips on how to work the contest effectively. Official log and entry forms are available for the asking from *CQ*, 76 N. Broadway, Hicksville, NY 11801, or from S.C.O.R.E., P.O. Box 1161, Denville, NJ 07834. This year's contest is scheduled for July 19–20, traditionally a time for great VHF/UHF propagation, so start planning for it *now*! With eight categories of entry and so many chances to win, there's no excuse for not getting involved in the VHF WPX. Who knows? You might take a trophy.

Product Review: The A.R.R. P50VDG/R50VDA 6 Meter Receive Preamp Converter

I've been promising to review this terrific 50 MHz receiving system for months, and I finally found the time to complete laboratory evaluation in March. I'm not sorry I waited so long to get the gear into the lab, for my procrastination gave me the opportunity to use the A.R.R. deluxe re-

24 Louis Dr., Budd Lake, NJ 07828

Say You Saw It In CQ



The A.R.R. P50VDG, 10 dB attenuator (not supplied by A.R.R.) and R50VDA high-performance converter. Small enough to mount inside many HF receivers, this combination will allow state-of-the-art reception of the 50 MHz amateur band.

ceiving converter/preamp combination at my home station for a long time, under every conceivable operating condition, prior to making any actual performance measurements.

The ARRL January VHF Sweepstakes and the terrific auroral opening in early February showed this receiving converter system to be the best I've ever used in 20 years of operating 6 meters. I found myself able to copy weak S1 signals only a few kHz away from intensely strong 60 dB/S9 signals with no degradation of the weaker signal. I also found the 50 MHz band to be free of any signs of intermodulation products, cross-modulated signals, images, unwanted mixing products, and all such nasty bugs during my 10 months or so of operation with the P50VDG/R50VDA. The few, very weak spurious signals I have heard were all determined to be caused by my 28 MHz receiver, since switching receivers chased them away.

What is this wonderful, proprietary receiving system? Nothing more than the Advanced Receiver Research R50VDA 50/28 MHz receive converter, driving a modified Hammarlund HQ215 solid-state amateur band receiver tuning 28 MHz, and preceded by the P50VDG GaAsFET preamplifier. I should mention that from the very start I took two precautions to help assure long front-end life and to avoid overloading the R50VDA converter: I installed a pair of Hewlett Packard 5082-2810 hot-carrier diodes connected as a 0.3 volt bipolarity transient suppressor directly across the input to the GaAsFET preamp, and also connected a 50 ohm, 10 dB resistive attenuator between the preamp's output and the converter's RF input. The first modification (the diodes) was my own idea, to help protect the fragile GaAs device from static transients, and the second (the attenuator) is recommended by A.R.R. in the "Operation" section of the R50VDA instructions.

Both the converter and the preamp are housed in RF-tight cast-aluminum enclosures and are very well constructed. Both use BNC receptacles for all RF, and feedthrough capacitors for all DC connections. Ground lugs are provided for the "–" DC connections. As can be seen in the photograph, I installed the 50 ohm, 10 dB attenuator between the two units by using a double-male BNC adapter; this seemed a handy way and avoids extraneous cables. The A.R.R. products have mounting flanges with predrilled holes for handy mounting to station equipment (cabinets), and both units have professional identification labels (top) and serial numbers (bottom).

Now for a bit of circuit description. The R50VDA converter is called by its manufacturer "a high-performance frequency converter." The circuit uses only four transistors, six discrete diodes, and a high-level doubly-balanced mixer (which contains four hot-carrier diodes in a balanced ring) to convert signals in the 50–54 MHz spectrum to 28–32 MHz. A pair of crystal oscillators using 2N3563 transistors are wired up for operation at 22 and 24 MHz, thus allowing complete band coverage with an IF that tunes only 2 MHz; only the 22 MHz crystal is normally supplied, and its oscillator is activated by the application of + DC to point "A," a feedthrough capacitor terminal.

The oscillator is buffered by another 2N3563 as an emitter-follower and then filtered by a seven-pole, modern-network low-pass filter. This filtered signal should be very free of any harmonic energy, but the LO injection to the doubly-balanced mixer is further filtered by another five-pole network prior to reaching its final internal destination (the LO input port of the mixer). There is an "LO Output" port (a BNC receptacle) mounted on the converter for the possible addition of a transmitting converter; this port receives drive from a tuned power divider at the output of the first seven-pole LO filter. Drive to the internal mixer, and drive available at the "LO Output" connector, is +7 dBm (5 mw).

The RF input to the balanced mixer is filtered by a three-pole bandpass filter consisting of three capacitors and six inductors. This filter is also of modern-network design (Chebyshev) and offers 2 dB loss and 0.1 dB "ripple." There is no RF preamplifier in the R50VDA, so its noise figure is that of the balanced mixer added to the loss of the input filter. The manufacturer states the noise figure to be 10 dB, a reasonable enough figure for such circuitry.

The beauty of this design is the high-end dynamic range of the balanced mixer, a Mini-Circuits type SBL-1. This mixer has an output intercept rating of +15 dBm. Assuming it offers 6 dB conversion loss (rated), that means an input intercept of +21 dBm! To assure the spectral purity of converted signals, the balanced mixer is followed by a diplexer circuit which provides proper (impedance) termination while passing only the lower-frequency mixed product to the IF buffer amplifier. The higher-frequency mixed product (50 + 22 MHz = 72 MHz) is terminated with a three-pole high-pass network to ground, while the desired lower-frequency mixed product (50 – 22 MHz = 28 MHz) is filtered by a three-pole low-pass network before driving the base of a very rugged bipolar transistor, type LT1001A, configured as a high-level Class A stage. The IF amplifier is biased for 20 dB gain and an output intercept of +40 dBm (10 watts!) to assure that dynamic-range performance is determined by the mixer alone.

The strong-signal end of things seems to be pretty well covered. But what about the weak-signal end? That's where the P50VDG preamplifier comes in. This preamp, rated at 24 dB gain and a noise figure $<$0.5 dB, uses a single MGF1400 GaAsFET in a grounded-source circuit. There is a simple L-network at the input to the active device, and output matching is accomplished with a bifilar toroid transformer. While fancy filtering could be used at the input to the transistor, any losses encountered with such components would add directly to the noise figure and are therefore usually avoided in low-noise designs. The P50VDG, like all the A.R.R. preamps, is a simple circuit indeed; the DC input line is regulated by a 78L05 integrated three-terminal device (5 volts output) and polarity-protected by a single series diode. Supply voltage to the preamp, then, is not especially critical: anything from 9–16 volts DC should work perfectly, and current drain is a miniscule 15 ma.

The primary advantage of a GaAsFET over other commonly available components which might be used for RF preamplification in the VHF range is the device's ability to handle very strong signals without saturation and without noise-figure degradation. Many inexpensive bipolar and MOSFET devices are available which would match the GaAsFET's noise figure at 50 MHz, but only the GaAsFET offers the high intercept point of a large-signal device while generating practically zero noise of its own. Of course, there are disadvantages to every situation, and the most important drawback to GaAsFETs

seems to be their intolerance to transient energy. You might say the device just doesn't have a sense of humor. Transient energy levels which might normally be considered inconsequential for most electronic components can instantly destroy GaAsFETs—thus, the pair of small-signal diodes I connected across the preamp's input, described earlier (a sacrifice to the GaAsFET gods in hopes that they may spare me the grief of replacing the device after each lightning storm).

Another funny thing about GaAsFETs: They have more gain than almost anyone needs. The P50VDG, rated at 24 dB gain, has about 10 dB more gain than required by its companion R50VDA converter to improve overall noise figure to <1 dB. Since excessive front-end gain will just degrade dynamic performance of the system, I felt compelled to throw away some gain by installing a 10 dB resistive "pad" between the P50VDG's output and the R50VDA's input. Careful digestion of the manufacturer's text regarding "operation" of the R50VDA will lead you to the same conclusion. As such, all data was taken with a 10 dB attenuator between the preamp and converter. Overall conversion gain would be 10 dB higher, at least for small signals, if this pad were removed from the circuit. Sensitivity, however, would remain unchanged, and high-level dynamic performance would be degraded without the pad. An advantage of using the resistive pad following the GaAsFET preamp, besides gain adjustment, is that it provides a nearly perfect 50 ohm termination for the preamp at all times.

I used a Hewlett Packard model 8640B as a signal source for all measurements, and the 28 MHz "IF" receiver was a Hewlett Packard model 8554B (RF)/8552B

Fig. 1– Schematic diagram of the A.R.R. R50VDA 50/28 MHz receive converter. The secret to its performance is the application of well-filtered signals to its high-level balanced mixer, and very high-intercept linear amplifier following the mixer.

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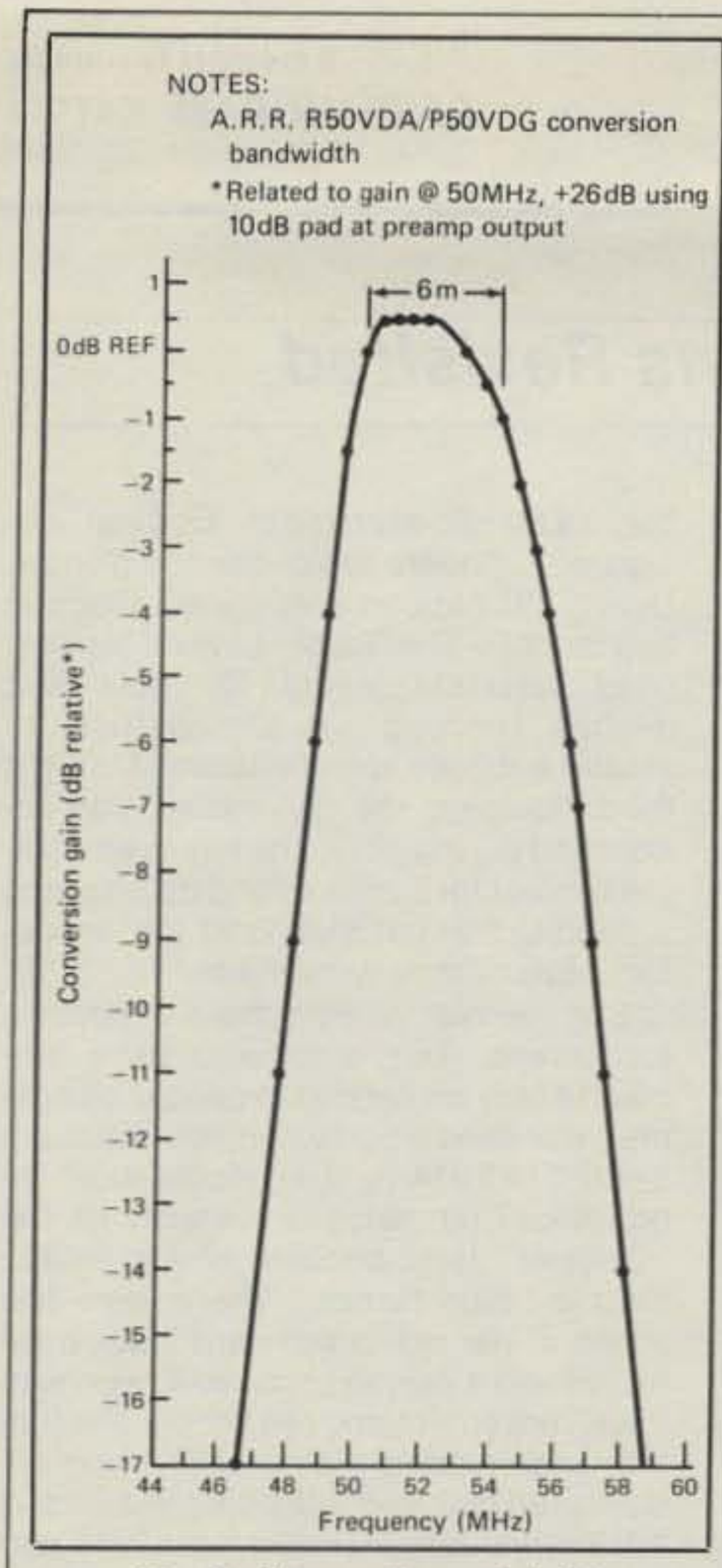

Fig. 2– Conversion gain table.

(IF)/141T (display) spectrum analyzer. With judicious use of the 8554B's input attenuator, this analyzer is capable of handling extremely strong signals without introducing any nonlinearity.

First, a check of total current drain: 90 madc at 12 volts, for the preamp/converter combination.

Next, a test for LO suppression: The 22 MHz LO signal measured −18 dBm at the "RCVR" (IF output) port, showing approximately 25 dB rejection from the internal LO signal. In most cases, this should mean very little to the end user.

Next, a test for the 1 dB compression point. Since I was not testing the preamp or the converter as individual units, but was evaluating the pair, this is a meaningful measurement. One dB compression occurred at +12 dBm output at 28 MHz. As you will see by the conversion gain table, this corresponds to an input level of −13 dBm at 50 MHz. This is a *very* strong signal, about 50,000 uV. At +12 dBm converter output most HF receivers would be totally saturated, as this is nearly 1 volt! Thus, it is likely that in a typical amateur system the HF receiver at 28 MHz would become the limiting factor in high-end dynamic range.

Conversion gain at 50 MHz measured 26 dB (remember, it would be 10 dB higher without the attenuator) for input levels below −13 dBm. This is surely enough gain for even a poor 28 MHz receiver, and may even be excessive for some receivers. Of course, an attenuator may be added at the IF output to reduce overall gain without degrading sensitivity.

I didn't have access to noise-figure measuring equipment on this occasion, but did measure receive sensitivity in a 1 kHz IF bandwidth: −136 dBm, or .036 uv, produced a 6 dB S+N/N. A −142 dBm signal, or .018 uv, would be the minimum detectable signal. This is pretty weak!

Conversion gain was reasonably flat from 50–54 MHz, especially when one considers I was measuring total response of the preamp, attenuator, and converter. The attenuator I use is an RF-shielded type made of microwave (chip) resistors and rated to 500 MHz, so it probably has no passband ripple of its own. Gain was down 20 dB at 46 and 60 MHz, showing an overall 20 dB conversion bandwidth of 14 MHz. Conversion gain versus input frequency is plotted elsewhere in this report.

In my home station I'm using an HQ215 receiver (vintage 1966) as the 28 MHz tunable IF. I've also used my 75A4 (vintage 1958) with similar results. While I do own some more modern equipment (!), much of today's gear handles strong signals no better than these older receivers. Perhaps a KWM380 or TS940 might show higher intercept performance on 10 meters. If so, overall dynamic range of the receiving system might be improved. I don't have any complaints about my receiving capabilities on 6 meters. The HQ215, with the R50VDA/P50VDG described in this review, "hears" about anything that can be heard with my location and antenna. I often run legal-limit output power (1.5 kw PEP) on 6, and have seldom heard of a station calling me without my hearing same. Sometimes I find myself giving "59" reports to 10 watt stations who give me a "55" in return, when I'm running 150 times their power! This should tell you something about the receiving abilities of the A.R.R. system.

It is especially impressive to shack guests for them to tune around 6 meters on a Sunday morning when the "ping jockeys" (meteor-scatter buffs) are working hard at exchanging reports over 1000 mile paths. I find that I can hear weak, residual scatter signals (perhaps .05 uv) quite well in the presence of considerably stronger locals (10,000 uv) nearly within my IF passband. This kind of performance is especially appreciated during contests or band openings, when things get very busy.

I'd recommend the P50VDG/R50VDA combination to anyone who wishes to enjoy "state of the art" reception on 50 MHz. The LO output from the R50VDA could be used for injection to a companion transmitting converter for total transceive operation. Now, if only A.R.R. would bring out that transmitting converter they've talked about for the past three years . . .

The A.R.R. equipment described is available directly from the manufacturer at Box 1242, Burlington, CT 06013. The P50VDG retails for $79.95, while the R50VDA sells for $94.95.

Well, that's about it. Start planning *now* for the VHF WPX Contest next month. And don't forget the June VHF QSO Party, too! We'll have a review of some RF (transmitter) power measuring equipment next month; this should be of great interest to many. Keep reading, and keep writing!

73, Steve, WB2WIK

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World of Ideas

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DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Classic Keys and Key Collections Revisited

Your interest and response to our May and June 1985 columns featuring classic keys and Neal McEwen, K5RW's unique key collection was phenomenal. Letters and off-the-air comments rolled in from around the globe, encouraging us to do it again. This month's column will thus honor those requests while shedding a special light on the classic times of yesteryear. Our views in this feature will lean primarily toward items recognizable to many old timers and relatively obtainable by neophyte key collectors. We'll also include some background on two of the more popular names in semi-automatic keys—Vibroplex and McElroy—plus some notes on getting started in the collecting game and using those keys on the air. Finally, we'll include a brief glimpse of one quite rare and desired key—the vertical Vibroplex.

Our brief tour of keys this time includes items in collections from western and eastern corners of the United States. Items highlighted are from the collections of Brad Wilson, KA1GDG (P.O. Box 631, South Carver, Maine 02366); Dick Randall, K6ARE (1263 Lakehurst Road, Livermore, California 94550); and Bill Holly, K1BH (RFD 1, Box 324U, Haley Road, Kittery Point, Maine 03905). As your guide, I'll add some personal thoughts and opinions along the way to share enthusiasm and inspire others toward key collecting. Due to unforeseen circumstances, Neal McEwen, K5RW, couldn't be with us this time. That doesn't preclude, however, another K5RW visit possibly before the year's end. The previously mentioned collections, incidentally, were started by amateurs such as yourself—individuals interested in keys/telegraphy and preservation of our proud heritage. Although each and every key collection is different in content, each began with one or two pieces and grew according to availability of items and personal interests. Since those and other collections typically include a number of Vibroplex items and since bugs themselves are the more "glamorous" type keys, let's begin with some background of the first semi-automatic key company.

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Vibroplex: An Overview

Vibroplex's slogan "The oldest name in amateur radio" is a well documented and justified statement. The company was founded in 1904 by semi-automatic key inventor Horace G. Martin. The item's original purpose and market was commercial telegraph facilities. However, amateurs quickly recognized their benefits and included them in home setups. The first models were made in New York and sported a nameplate "The Vibroplex by Horace G. Martin." A few years later the nameplate was changed to its presently familiar style and shape. The plate's red bug logo, however, wasn't included until the 1920's.

The first semi-automatic key was appropriately dubbed number one, or the "Original." Except for a minor change to a U-shaped dot contactor, that same style is still available today. Indeed, the chrome and gold model "Presentation" bug is a classic example of "Original" design with modern top-of-the-line glamor. During 1911 Martin announced a second bug model—The Double Lever. This item used separate levers for dots and dashes. The bug was slightly tricky to master but quite speed efficient. Martin's third Vibroplex, the "X" model, was announced during 1912. The key used a single contact for both dots and dashes, and a special damper stabilized the pendulum while dashes were made.

Commercial telegraphers' requests for smaller semi-automatic keys that could easily be carried to special assignments or used on crowded desks was answered in 1914 by the "model four" Vibroplex. That half-size version of the "Original" later became known as the classic "Blue Racer." There were two styles of Racers: a standard black-base model and a deluxe chrome version with jewel movement and red knobs. The fifth Vibroplex model, the "Martin Upright," was a unique vertical bug produced in 1917. This item included the single dot/dash contact arrangement used in the earlier "X" model and featured a U-shaped base with its working parts extending upward. The sixth Vibroplex was the ever popular "Lightning Bug" which acquired the military designation "J36." This item enjoyed widespread use by both radio amateurs and U.S. forces during World War II. It was available in standard black, plus chrome, red, green, and blue bases. The seventh Vibroplex model, the "Martin Junior," was introduced in 1930. This item's main attraction was low cost—an appreciated benefit among financially restricted amateurs. Martin left

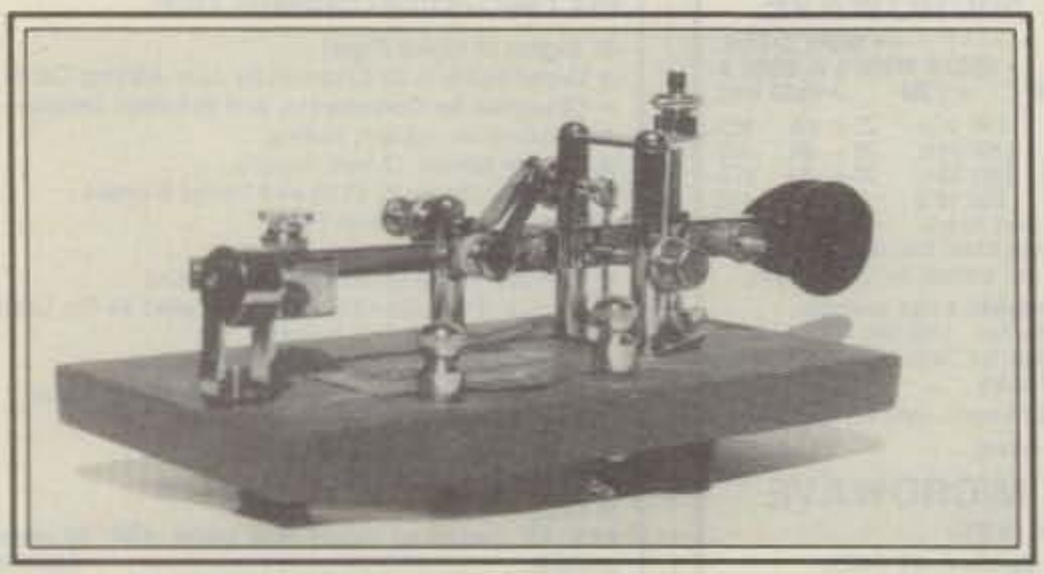

Fig. 1– KA1GDG's "Champion" model Vibroplex provides good study of bug designs. Notice the yoke, flat pendulum, square weight, and single damper post, and compare those pieces with fig. 2.

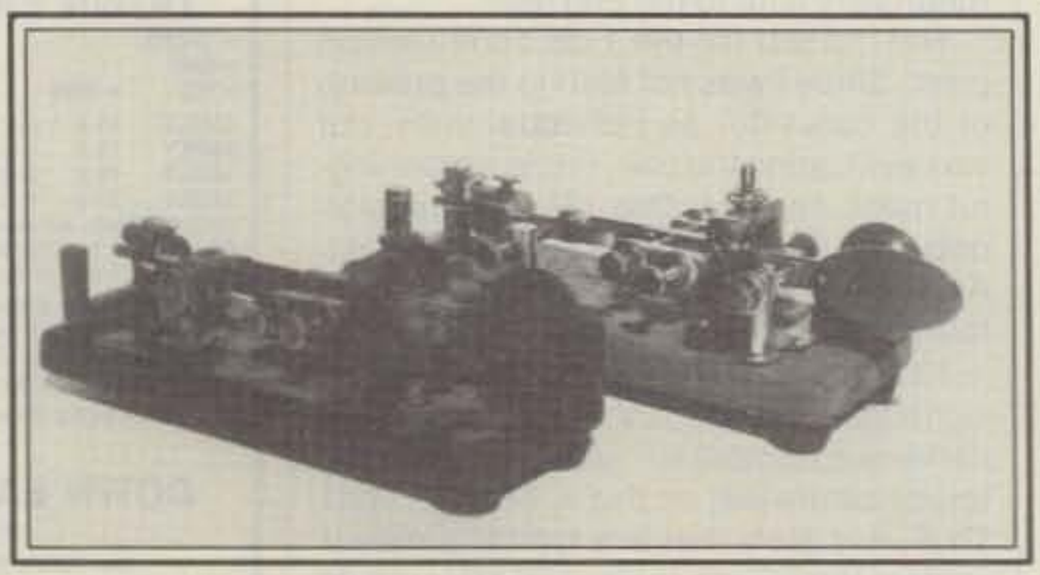

Fig. 2– Two more KA1GDG keys. Bottom item is Vibroplex model four (1914 vintage). Upper key is its descendant, the "Blue Racer." Note round yoke, round pendulum and weight, and the U-shaped damper mount. Comparison in text.

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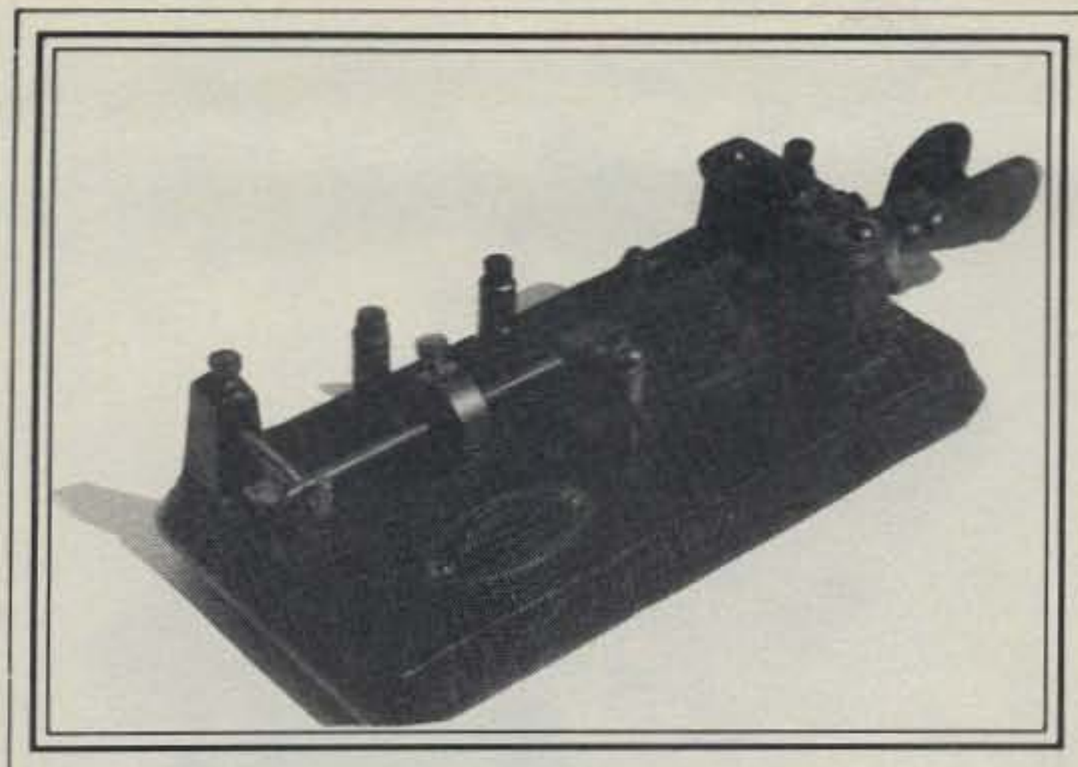

Fig. 3– The A. H. Emory "Go Devil" was an inexpensive yet effective semi-automatic key available to amateurs during the mid '30s. Pendulum could be damper-locked for sideswiper operation. (Photo via KA1GDG)

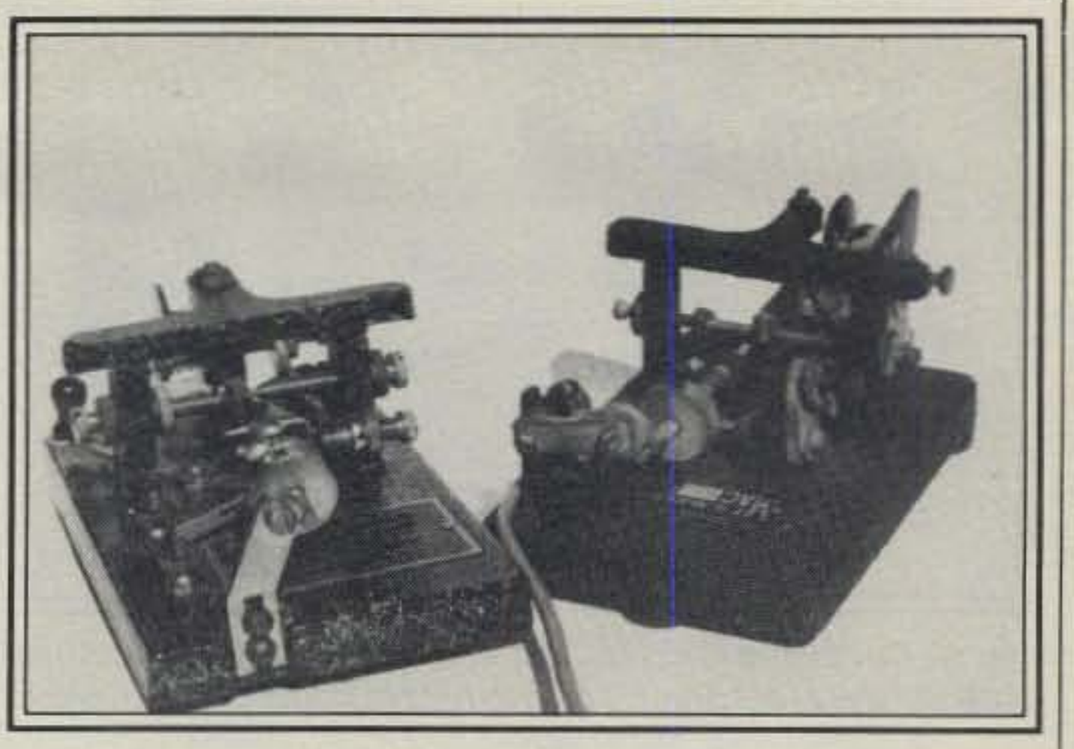

Fig. 4– Two always favored items among collectors are Mac Keys. Left bug is "deluxe" model and right bug is standard version. (KA1GDG collection)

Vibroplex during 1930, but subsequent models continued to evolve: the Zephyr, Champion, Presentation, and their most recent items, the Vibrokeyers. That's enough background for this time. Now let's take a look at some of those classic keys!

Figure 1

Although this item may not qualify in the rare and exotic category, it includes several discussion points for bug enthusiasts. This "Champion" model Vibroplex is one of KA1GDG's immaculate collection. Its overall design is simple, and it's generally a good slow-speed bug for neophytes. (I say "generally" because every bug's vibrating mainspring or "personality" is different. That single piece is the deciding factor that makes every bug's "feel" different.) Notice the bug's yoke (large piece at key's main pivot point) is a three-section pedestal with flat top (third piece almost hidden in this particular photo, but its extending top screw is quite visible). That along with the flat pendulum and square weight usually depict a "Lightning Bug." The "Champion" differs in appearance, however, by its single post mount for the pendulum's damper wheel. Sharp-eyed amateurs will notice this version of the "Champion" is for left-handed use, a somewhat rare feature in any bug.

Figure 2

These two KA1GDG items are a vintage "Model Four" Vibroplex (lower key) and its successor, the "Blue Racer." These bugs are recognized by their smaller than usual size, inverted U-shaped yoke, and a small U-shaped frame holding the damper wheel. We also understand some Racers were produced which used a small version of the "Original's" top-curved damper wheel holder. Either way, the Racer is detected by its trim size. Blue Racers are usually fast bugs, but an extra weight on their pendulum will slow them quite effectively. Vibroplex usually marks their keys with serial rather than model numbers, so recognizing their design is the key to identification. A flat pendulum, yoke, and dual post damper bar usually signify a "Lightning Bug." A large rounded yoke and "top swinging" damper bar symbolize an "Original." A small bug is a "Blue Racer." Get the idea?

Figure 3

Here's another of KA1GDG's items with an interesting history: The A.H. Emory "Go Devil." Approximately 400 of these keys were manufactured after Martin's "exclusive patents" expired and everyone could join the action. The bug was quite basic in design and performance. Although their "feel" left something to be desired, their price was quite reasonable and attractive. These keys were manufactured during the mid-1930s. A small clamp could be affixed to the damper's "hook" for converting the key to a sideswiper (make dots/dashes on either side manually—no vibrating mainspring action).

Figure 4

Two final items from KA1GDG's collection are these deluxe (left side) and standard model (right side) Mac Keys. These rugged and smooth-operating bugs were manufactured by Ted R. McElroy's company prior to World War II. The deluxe key features a solid iron base painted in simulated marble, and the standard model employs a flat black iron base. Notice the key's unique "T"-bar yoke. This feature allowed the operator to hook a couple of fingers around it for easy carrying to/from shifts. The key can also be used "manual style" by damper-locking its pendulum and placing the whole unit on its side (its "T" bar stabilizes operation).

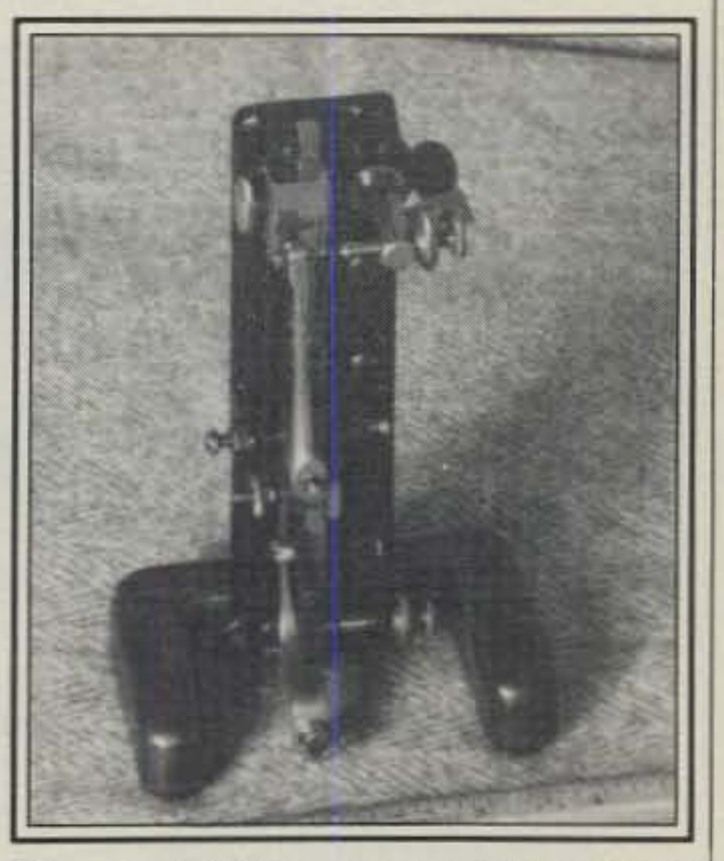

Fig. 5– K1BH's classic "Wirechief's Key," so dubbed because it required minimum space on a crowded desk. These gems are quite rare and usually reflect substantial investments.

Ted R. McElroy was well known as the World's Champion Radio Telegrapher. His 1939-established record of 77 words per minute Morse copy remains unchallenged, and his public demonstrations of high-speed copy were always fascinating events. Several old timers have described McElroy as a friendly and good-natured chap who always enjoyed a few stout drinks before a code speed run. Legend relates he once entered a speed run sober and lost. We don't suggest Morse-lax amateurs try this technique, however.

Figure 5

K1BH's classic and quite rare vertical Vibroplex is pictured here. Affectionately

No -71-72

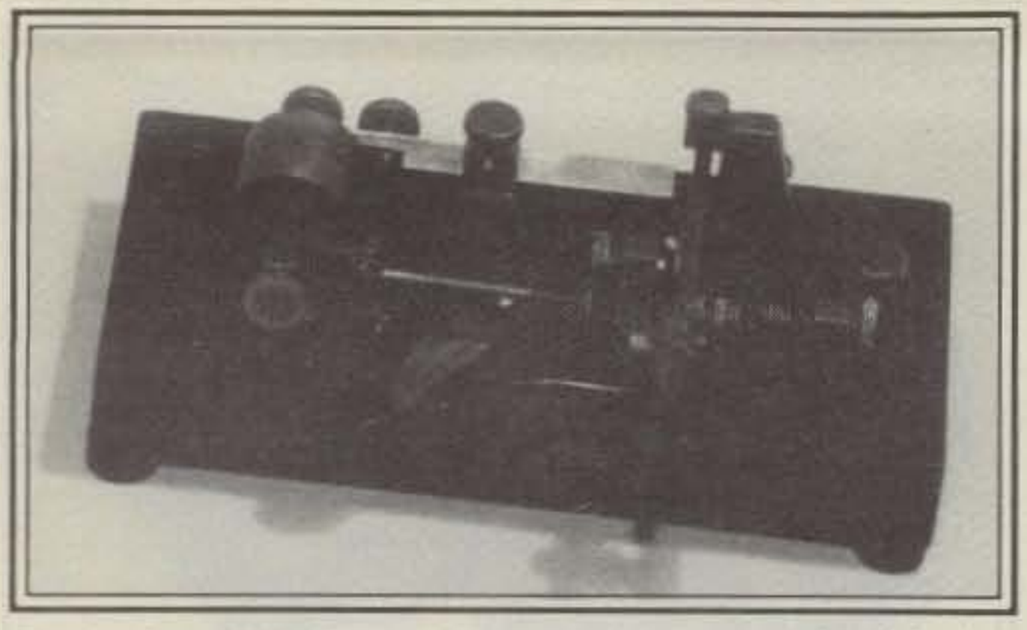

Fig. 6– One of the first semi-automatic keys to defeat Martin's patents: the Mecograph bug. Item from collection of K6ARE. More details in text.

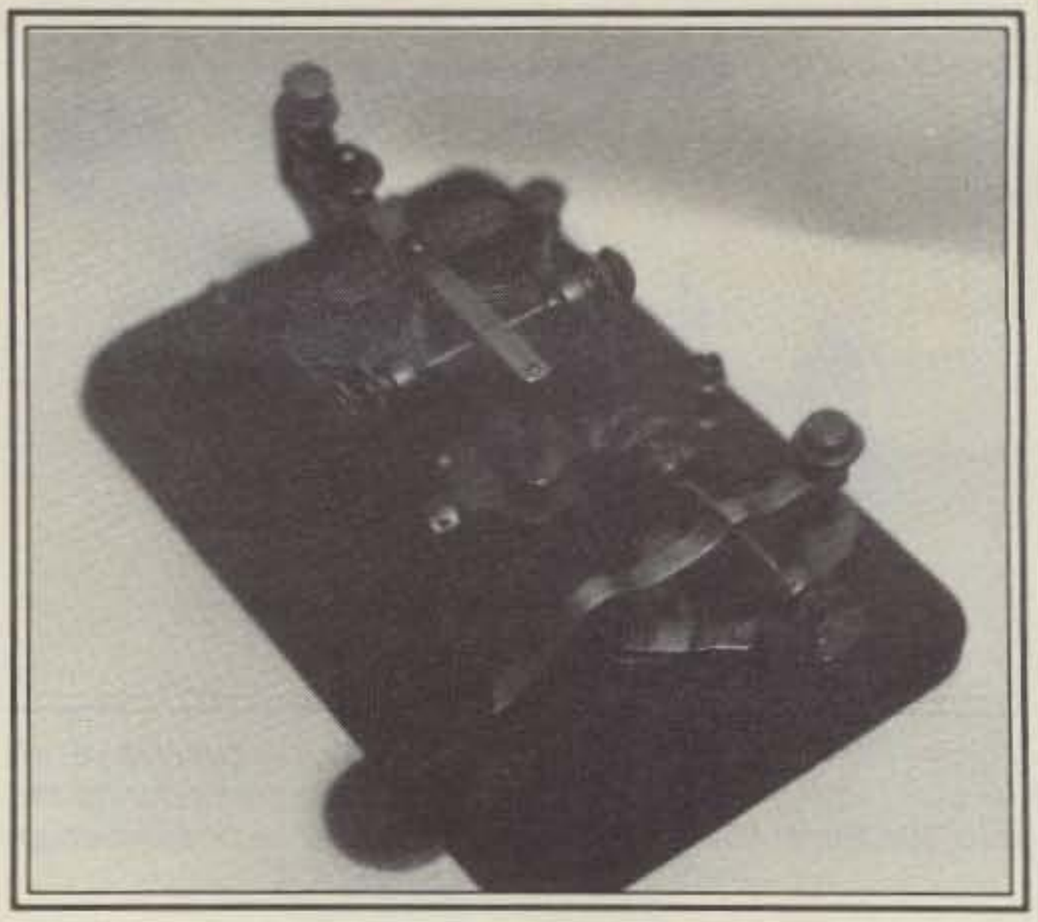

Fig. 7– Genuine Camelback key on wood board is flanked by telegraph sounder. Item was manufactured by Bunnell during the late 1800s. (K6ARE collection)

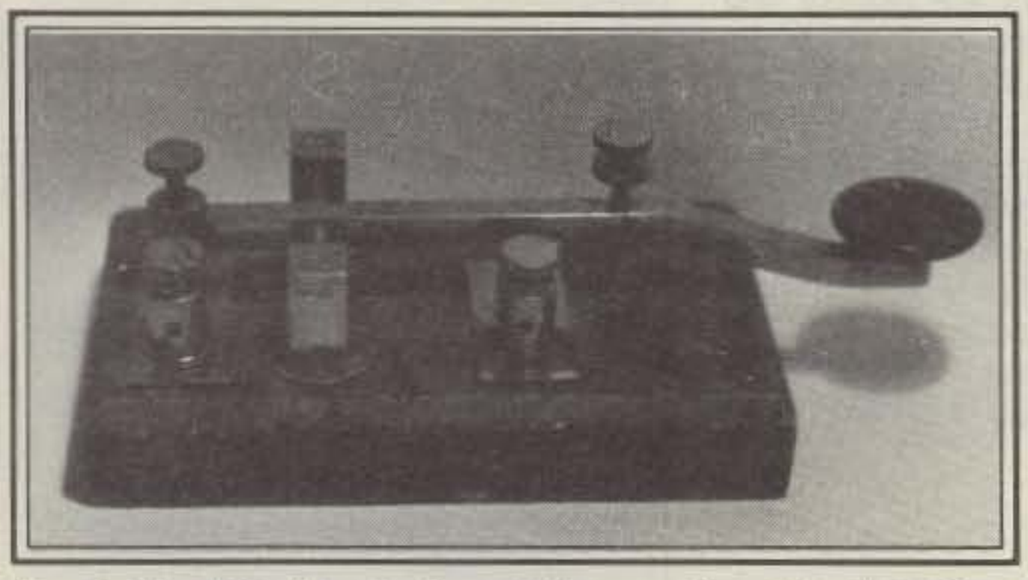

Fig. 8– The "Cadillac" of spark keys: a Clapp Eastham item mounted on a marble base. This K6ARE key uses ⅝ inch contacts and was manufactured in 1915.

Fig. 9– Russian hand key purchased by K6ARE during a 1969 visit to the USSR. Details in text.

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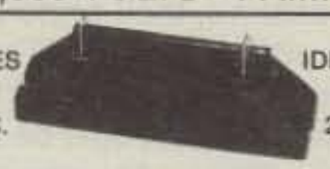

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dubbed the "Wirechief's Key," it occupies minimum desk space with its upright design. The key uses a single dot/dash contact setup and reportedly has a very smooth feel during operation. Finding a vertical bug is a tremendous challenge within itself (they were not widely advertised even during their heyday), and securing such "uncovered" items is even more challenging. Typical prices of these gems range between $300 and $600, but their owners usually stipulate trades rather than purchases (heck, that one key could equal a small collection's full cost!). Maybe some clever entrepreneur will soon produce some replicas of this gem.

Figure 6

Moving to K5ARE's collection, we have one of the first semi-automatic keys to overcome Martin's patents: the Mecograph bug. This 1909-manufactured key boasts right-angle construction and generates dots by releasing rather than applying pressure to its vibrating pendulum. Due to its unique design, the bug is obviously a collector's delight.

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Figure 7

Camelback hand key and vintage telegraph sounder on wood base, this unit was made by J.H. Bunnell Company in New York before the turn of the century. The name "Camelback" came from the lever's design. Its idea was reducing strain on operators during long periods of use—the glass-arm syndrome.

Figure 8

Continuing with K6ARE's collection, here's one of the top keys from the spark era. This key was made by the Clapp Eastham Company in Boston, Massachusetts during 1915. It's assembled on a marble base and sports ⅝ inch contacts. This model was designed for use on private yachts and luxury liners. One can almost visualize flames shooting from this beauty during spark use!

Figure 9

This Russian straight key was purchased in Moscow during 1969 by K6ARE. The item's cost was roughly equivalent to $20 U.S. Key has white plastic double knob, black metal lever, and thin U-shaped bracket at fulcrum. An adjustment tool was included with the key.

Figure 10

Miniature keys are always a blast to use, and these three K6ARE items are no exception. Left key is 2½ by 2 inches and came from an associate of Lee DeForest. Middle key is 1 by 1 inch (!) and includes silver contacts mounted in teflon to reduce noise. Item was made for CIA use with spy-type transmitters. A three-piece tool kit is included for adjustment. Right key is 1½ by 2½ inches and was used by the U.S. during World War II.

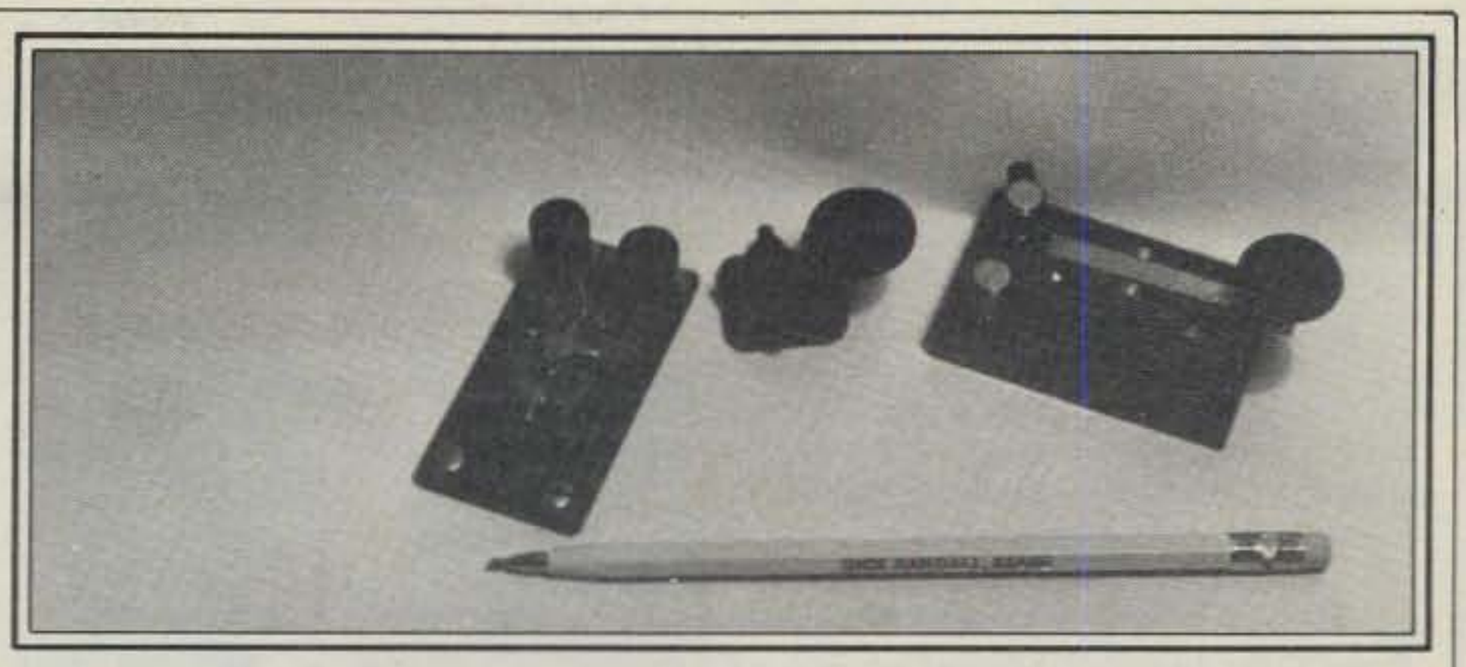

Fig. 10– Three of K6ARE's miniature hand keys. Notice the middle gem. It's only 1 inch square! That's the way to add new fun to CW operations.

Collecting and Using Classic Keys/Bugs

Say our views and narrations are inspiring you to join the collecting game? Great! Starting one's own collection usually involves locating items of personal appeal, bargaining for those items, then cleaning/refurbishing them as desired. Finding keys is half the challenge, and any technique or approach within logical reason is fair game. Think, plot, and use your ingenuity! Hamfest fleamarkets, old railroad depots, and antique emporiums are good starting points. If you acquire three keys from six hunting ventures, you're batting 1000 and overly lucky. Advertising also pays. Lapel pins, business cards, and magazine ads stating your pursuit yield high returns.

There are few, if any, specific guidelines regarding what one should pay for a particular key. The criteria usually involves what the seller will accept and the purchaser will offer or barter. Since many (all?) collectors are more interested in trades than sales, maintaining an inventory of duplicates, or "swap keys," is quite beneficial.

While key refurbishings are generally a matter of personal preference, one should strive to retain an item's originally manufactured appearance and "personality." Replacing broken fingerpieces, pitted contacts, or broken springs is typical, but repainting bases or other pieces with unusual colors is simply heartbreaking. Keys in fairly good condition also clean up nicely using a good-quality relay/contact cleaner and soft brush.

Using classic keys/bugs during on-the-air QSOs can prove the ultimate reward for one's collecting and refurbishing efforts. Bugs don't require external power or batteries, and they add a personal sound to one's fist. When adjusting a bug, be sure to leave plenty of travel on both dot/dash "sides." Also use slightly more than usually comfortable tension . . . and add a "touch" more tension on the dash side. If the bug's speed is too fast, add an extra weight to slow it. Place the bug almost sideways in front of you, and curl your fist around slightly so it's easy to keep pressure on the dot side. Beyond that point, you're on your own. Enjoy, operate more CW, and we'll be listening for you on 30 meters!

STATE OF THE ART

The ARRL 1986 Handbook For The Radio Amateur carries on the tradition of the previous editions by presenting 1192 pages of comprehensive information for the radio amateur, engineer, technician and student. Paper edition: **$18** in the U.S., **$19** in Canada, and elsewhere. Clothbound **$27** in the U.S., **$29** in Canada and elsewhere.

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CIRCLE 34 ON READER SERVICE CARD

DX

this month by
JOHN A. ATTAWAY, K4IIF

NEWS OF COMMUNICATIONS AROUND THE WORLD

"For now many things,
which for our own sake we should never do,
do we perform for the sake of our friends."
Marcus Tullius Cicero

The CQ DX Awards Advisory Committee is pleased to announce the election of Mr. Jim Smith, P29JS/VK9NS, to the DX Hall of Fame.

Election to the DX Hall of Fame is the ultimate honor for a DXer, and is only conferred on amateurs whose contributions to DX have been "above and beyond the call of duty, made often at great personal sacrifice of time and resources with no thought of personal gain, and which have stood the test of time." Those elected to the Hall of Fame have included great DXpedition operators, leading QSL managers, DX writers, and others who have given fully of themselves and of their time for DX.

Jim Smith's nomination was from the category of great DXpedition operators. Since 1948, when he first operated on the 20 meter band as CAR from Car Nicobar Island, Jim has held 28 different callsigns. In recent years many of his expeditions have been major events producing thousands of contacts from each location. Jim is a communications engineer by profession. He works for the Civil Aviation Agency in Papua/New Guinea and has a small electronics business on Norfolk Island.

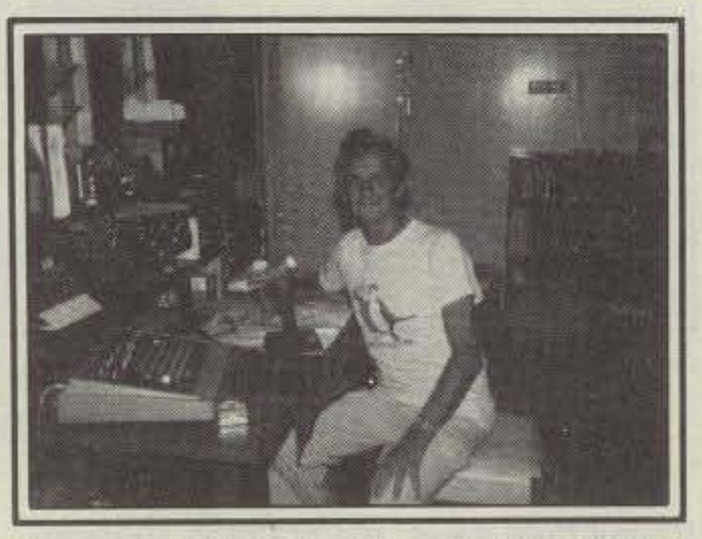
Jim Smith DXpeditions are balanced with 50% CW and 50% SSB. His major operations over the past decade have included VR4BJ from the Solomon Islands in 1977 where he made 5,800 contacts; VK9YS from Cocos-Keeling in 1978 with 9,700 contacts; C21AA from Nauru in 1979 with 9,700 contacts; T30KJ from Kiribati in 1979 with 1,200 QSO's; VK9NS from Norfolk Island in 1980 with 9,800 contacts; VK9NS/LH from Lord Howe Island in 1980 with 1,500 QSO's; ZM7JS from Tokelau Island in 1981 with 10,500 contacts; 5W1DG from Western Samoa in 1982 with 5,800 QSO's; 9M8JS from Sarawak in 1982 with 5,500 contacts; and VK0JS from Heard Island in 1983 with 14,500 contacts.

Other callsigns used by Jim Smith during his long DX career were CAR from Car Nicobar Island in 1947–48; VS1BQ from Singapore in 1948–51; G3HSR from the U.K. from 1951 until his son received this call in 1983; DL2TH from Germany in 1955–57; HZ1AB (guest operator) Saudi Arabia 1963–64; MP4BER from Bahrein 1963–64; 9V1PR from Singapore 1968–71; P29JS from Papua/New Guinea 1975–present; H44BJ from the Solomon Islands 1977–present; ZL0AAB, a temporary call in New Zealand, in 1981; and ZL1BUN from New Zealand from 1981–84. He was accompanied on his DXpedition to Cocos-Keeling in 1979 by F6CYL and by his wife Kirsti to Western Samoa in 1982, Sarawak in 1982, and Heard Island in 1983. Kirsti's callsigns for these DXpeditions were 5W1DK, 9M8NL, and VK0NL.

The Jim Smith Pacific DX Net, which he formerly ran every night from Papua/New Guinea on 14220 using a crystal-controlled rig, handled over 150,000 transactions prior to 1984. At one time Jim counted over 265 countries which had checked into this net.

CQ received three nominations from three separate DXers proposing P29JS/VK9NS for the DX Hall of Fame. These were Bob Winn, W5KNE, editor of *QRZ DX*; Alan Leith, VE3FRA/VE1AL, past editor of the *DX Report*; and Dr. Sanford E. Hutson, K5YY, who is himself a member of the DX Hall of Fame. In supporting Smith's election to the Hall of Fame, Committee Member Hugh Cassidy, WA6AUD, commented that "Jim Smith has continued to be active as a DXer quite literally for decades. He has never tired of operating and DXing. He is consistent."

Congratulations to Jim Smith, P29JS/VK9NS, DX Hall of Fame!



Congratulations to Jim Smith, P29JS/VK9NS, on his election to the DX Hall of Fame. Jim is shown above operating his well-equipped station on Papua/New Guinea. (Thanks to Bob Winn, W5KNE, editor of QRZ DX, *for the photo.)*

De Extra

If you are a DX award chaser, working a rare zone, prefix, or country is only half the battle. Getting the QSL card is the other half.

Many DXpeditions and other stations operating from rare locations use the services of QSL managers to handle the many cards they will receive just for being "rare." Major DXpeditions are always vulnerable to the deluge as they frequently generate 10,000 or more QSO's in only a week of operating. Handling the QSLs for one of these operations is a major task with many frustrations caused by those who make fundamental mistakes such as using local time on their QSLs, not enclosing a self-addressed, stamped envelope (SASE), including several cards in one envelope, and other practices which

THE DX HALL OF FAME

Gus. M. Browning, W4BPD
Nov. 1, 1967

John H. Cummings, W2CTN
March 23, 1968

Stewart S. Perry, W1BB
Aug. 16, 1968

Richard C. Spenceley, KV4AA
March 1, 1969

Danny Weil, VP2VB
Sept. 15, 1969

H. Dale Strieter, W4DQS
May 23, 1970

Stuart Meyer, W2GHK
Oct. 31, 1970

Martin Laine, OH2BH
Jan. 22, 1972

Ted Thorpe, ZL2AWJ, and Chuck Swain, K7LMU
Aug. 6, 1972

C.J. (Joe) Hiller, W4OPM
March 30, 1973

Ernst Krenkel, RAEM
April 14, 1974

Frank Anzalone, W1WY
June 19, 1976

Lloyd Colvin, W6KG, and Iris Colvin, W6QL
Nov. 12, 1976

Geoff Watts, Editor and Publisher
June 11, 1977

Don C. Wallace, W6AM
Sept. 23, 1978

Joe Arcure, Jr., W3HNK
Dec. 1, 1979

Hugh Cassidy, WA6AUD
April 26, 1980

Eric A. Sjolund, SM0AGD
April 21, 1981

Franz Langner, DJ9ZB
May 9, 1982

Dr. Sanford E. Hutson, K5YY
Jan. 22, 1983

Rodney H. Newkirk, W9BRD
Feb. 25, 1984

Ronald W. Wright, ZL1AMO
April 20, 1985

Herb Becker, W6QD
April 20, 1985

Jim Smith, P29JS/VK9NS
April 26, 1986

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The WPX Program

Mixed

1203	KA6SWI	1206	AC2J
1204	I1FY	1207	TI9RC
1205	G4SDJ		

S.S.B.

1785	KD9OT	1789	K8JRK
1786	I8ZTE	1790	EA4KK
1787	JA9IFF	1791	I2IAU
1788	KA5GRP	1792	IT9ONV

CW

2355	DL3HAH	2359	DK2AU
2356	G4SSH	2360	JR8JTO
2357	SM6MSG	2361	WD8RTW
2358	J48NTR	2362	IK2CJH

Endorsements

Mixed: 450 KA6SWI, HB9BIN, I1FY. 500 HB9BIN, I1FY, OZ4ZT. 500 HB9BIN, I4FY, OZ4ZT. 550 I1FY, OZ1ACB. 600 K6UXO, I1FY. 1050 OK3IF. 1100 OK3IF. 1150 WB4RUA. 1200 WB4RUA, WB8ZRL. 1500 N4UH. 2250 W4BQY. 2300 W4BQY.

S.S.B.: 350 I8ZTE, JA9IFF, K8JRK, EA4KK, I2IAU. 400 I8ZTE, K8JRK, EA4KK, I2IAU. 450 I8ZTE, K8JRK, EA4KK, I2IAU. 500 KS3F, K8JRK, EA4KK, I2IAU. 550 KS3F, K8JRK, EA4KK. 600 K8JRK, EA4KK, I3ZSX. 650 EA4KK. 700 EA4KK. 750 EA4KK. 1050 WB8ZRL. 1350 WF4V. 1400 WF4V. 1450 WF4V. 1500 WF4V. 1600 W4BQY.

C.W.: 350 DL3HAH, JR8NTR, DK2AU, VE6BSS, WD8RTW. 400 DL3HAH, DK2AU. 450 DL2HAH, DK2AU. 500 DL3HAH, DK2AU. 550 DL3HAH, K7DBV. 600 DL3HAH, K6UXO, PA3DBG. 650 DL3HAH, WB8ZRL, PA3DBG. 1050 AK9Z. 1100 OK1DKR. 1850 W3ARK. 1900 W3ARK. 1950 W3ARK. 2000 WA2HZR.

10 meters: W4ZYQ.
15 meters: JA9IFF.
20 meters: PA3DBG, OZ1ACB, OZ4ZT.
40 meters: ZS6BCR.
80 meters: WB8ZRL.
160 meters: K7CU.

Asia: JA9IFF, JR8JTO, OZ1ACB.
No. America: SV1PL, W4ZYQ.
Europe: SV1PL.
Oceania: JA8EZR.

Award of Excellence: W6OUL, WB8ZRL.
Award of Excellence 160M Endorsement: W6OUL, W4BQY.
Award of Excellence Holders: DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, YU2DX, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP, K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, WB8ZRL.
Award of Excellence Holders with 160 Meter Endorsement: W5UR, W8RSW, W8ILC, W1BWS, G4BUE, LU3YL/W4, VE7WJ, W9NUF, N4NX, SM0DJZ, DK5AD, W3ARK, LA7JO, W4VQ K6JG, W4CRW, N4MM, SM0AJU, KF2O, K5UR, OK1MP, N5TV, W8CNL, W1JR, W6OUL, W4BQY.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

defeat the purpose of confirming a rare station.

One of the best articles advising DXers on ways to overcome this roadblock was written by Terry Baxter, N6CW/VP2VCW, who is himself a prominent DXpedition operator and QSL manager, and appeared in the *Southern California DX Club Bulletin* under the title "How To Keep The QSL Manager Happy." Terry's advice is as follows:

1. *QSL Cards:* Your QSL card should have the QSO information *and* your callsign on the same side. If they are not

Lee Wical, KH6BZF/7J1AAP. Lee was the first KH6 to receive a 7J1 callsign under the U.S./Japanese reciprocal-licensing agreement. Lee's phonetics, "the KH6 Bloomin' Zipper Flipper," have been among the best known on 20 meters for many years.

printed that way, write your call on the information side. It is very time-consuming for the QSL manager to turn cards over to find your callsign. Thirty-five percent of the cards received have this problem.

Print some cheap cards to send to DXpedition QSL managers, as they are usually thrown away. Save your nice cards for non-DXpedition stations.

It is essential that you have the correct date/time/band, etc., on each card. Send separate cards for each band and separate envelopes for each if you are in a hurry to get the cards returned. The reason is simple. Any card received that is not found in the log on the first try, or multiple cards which require extra time, are put aside until all others are finished.

2. *Envelopes:* Always enclose a self-addressed, stamped envelope, using standard, letter-size envelopes preferably of the self-sealing type. Legal-size envelopes and 5″ × 7″ sizes are a problem to file.

3. *How to Put It All Together:* Fold your SASE in half and insert it in the sending envelope with the fold at the bottom. This keeps your SASE from being cut in half with a letter opener. If you are enclosing a dollar bill with the card, place it in the fold of the SASE, not inside where it may not be found. Finally, place your QSL in the fold of the SASE. Following these instructions will result in a neat package with the card, dollar bill, or IRC's and SASE all coming out of the sending envelope in one motion.

4. *Other Hints:* Don't write nasty notes to the QSL manager about the expedition.

Do have patience. It takes time to have cards printed following an expedition, and this causes a large backlog to answer at one time. Following the above instructions will ensure a quick response.

If your card is rejected as NOT IN LOG, wait several months until the QSL manager is caught up and try again. Sometimes we make mistakes.

Most Wanted Countries

At the end of each year Jim Cain, K1TN, editor of *The DX Bulletin*, and Gerben Menting, PA0GAM, editor of *DX 'Press*, each publish a list of countries most needed by DXers pursuing DXCC and the *CQ* DX Awards. Each draws on inputs from large numbers of DXers. Their basic want lists compare as follows:

Rank	By K1TN	By PA0GAM
1	ZA, Albania	3Y, Bouvet Island
2	70, South Yemen	70, South Yemen
3	3Y, Bouvet Island	VU5A, Andaman
4	VU7, Andaman	XV, Vietnam
5	XV, Vietnam	XZ, Burma
6	YA, Afghanistan	YA, Afghanistan
7	4W, Yemen	5A, Libya
8	XZ, Burma	ZA, Albania
9	5A, Libya	4W, Yemen
10	S2, Bangladesh	1S, Spratly Islands
11	XW, Laos	VP8, South Sandwich Is.
12	A6, United Arab Emirates	VP8, South Georgia Is.
13	XU, Kampuchea	S2, Bangladesh
14	S9, Sao Tome	XW, Laos
15	A5, Bhutan	SY, Mt. Athos

The countries on both lists are basically the same, but the individual rankings vary according to U.S. flavor or European flavor. For example, ZA, Albania is #1 here, but all the way down to 9th place in Europe, where it can easily be worked on any band when someone is fortunate enough to be licensed and on the air. However, Libya is a contrast in ranking 5th in Europe but only 7th in the U.S. Libya is again a "backyard" country for European DXers whenever it is on the air. Needless to say, any of the above countries will produce a pretty good pileup.

Be Informed

One of the secrets of the Honor Roll DXer is to be informed. When you sit down at the rig, you must know the who, what, where, when, and even the why of stations on the air from rare, "needed" countries. Then, the second secret is listen, listen,

The WAZ Program

20 Meter Phone

554 NW4K

40 Meter CW

54 HB9ALO 55 JA0CWZ

80 Meter CW

7 SM4CAN

All Band WAZ

SSB

3006	I2MMH	3008	DJ1DX
3007	I2UPG	3009	N2CIC

Phone and CW

5941	N5CE	5946	I2KKL
5942	VE1QN	5947	JA0BSL
5943	OZ2E	5948	FE2PC
5944	W6KFV	5949	OK2BFX
5945	WL7E		

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (39 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

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5 Band WAZ

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2. K4MQG	41. I4RYC	80. DL7HZ
3. SM4CAN	42. ZL1BIL	81. DJ9RQ
4. AA6AA	43. I4EAT	82. EA5SP
5. W8AH	44. ZL1BQD	83. EA2IA
6. W6KUT	45. TG9NX	84. SP3BQD
7. EA8AK	46. XE1J	85. LZ1NG
8. LA7JO	47. F5VU	86. N4JF
9. EA3SF	48. W3AP	87. CT2AK
10. OH1XX	49. YO3AC	88. HB9CIP
11. EA8OZ	50. K3TW	89. OK1MG
12. W0SD	51. XE1OX	90. CT4BD
13. K0ZZ	52. VE7IG	91. VK6HD
14. ON6OS	53. OK1ADM	92. EA6ET
15. OK3TCA	54. CT1FL	93. VK3QI
16. K6SSS	55. WA1AER	94. LZ2DF
17. ZL3GQ	56. N4RR	95. ON4QX
18. OK3CGP	57. UW0MF	96. SM0DJC
19. SM0AJU	58. W4DR	97. CT3BM
20. OZ3PZ	59. OK1MP	98. K2TQC
21. I3MAU	60. W1NW	99. EA8XS
22. I2ZGC	61. OE1ZJ	100. HA9RE
23. 4Z4DX	62. HB9AHL	101. SM4CTT
24. N4KE	63. HB9AMO	102. A71AD
25. K5UR	64. LA6OT	103. LZ2CC
26. K9AJ	65. UR2QD	104. SM4CLE
27. SM3EVR	66. UK2RDX	105. LZ1HA
28. LA5YJ	67. ZS5LB	106. SM5AKT
29. DL3RK	68. F6DZU	107. CT4NH
30. N4WJ	69. DL4YAH	108. ZL4BO
31. G3MCS	70. LA7ZO	109. I1BSN
32. SM5AQD	71. W9ZR	110. DF6CY
33. W0MLY	72. W1NG	111. DK5AD
34. I0RIZ	73. VK9NS	112. DL6EN
35. ON5NT	74. N4KG	113. SM6CVX
36. OH6JW	75. YU7DX	114. LU8DPM
37. OK1AWZ	76. DL8MAG	115. SM6DYK
38. IV3PRK	77. OK3DG	116. DL7XS
39. DJ6RX	78. ZL1BOQ	

The top 13 contenders for 5 Band WAZ are:

1. JA1BWA, 199	8. W6GO, 198
2. JA3EMU, 199	9. K4CEB, 198
3. N4WW, 199	10. W2YY, 198
4. K6YRA, 199	11. G3GIQ, 198
5. W8UVZ, 199	12. K7UR, 198
6. F6BEE, 198	13. W3GG, 198
7. LU6GV, 198	

360 Stations have attained the 150 zone level.

listen. The Honor Roll DXer didn't get there by calling "CQ Dog Xray."

To be informed a DXer must do more than read the monthly DX columns in *CQ* and *QST*. Hugh Cassidy and Ellen White submit their copy to their respective editors two to three months prior to publication. There is no way they can be current. Actually, I am writing this in March for the June DX column. Therefore, to keep up you must read one of the weekly DX bulletins, plus as many club bulletins and other sources as you can feasibly gather. Only then can you make best use of the time you have at the rig. Nothing is more precious than time and it must be used wisely.

At *CQ* we read the following bulletins, which are arranged in alphabetical order with names, callsigns, and addresses shown:

DXers Magazine, Gus Browning, W4BPD, P.O. Drawer DX, Cordova, SC 29039.

DX-NL, Walter Geyrhalter, DL3RK, Box 1328, D-8950 Kaufbeuren, West Germany.

DX'Press, Gerben Menting, PA0GAM, Oldenoert 152, 9351 KT Leek, The Netherlands.

Long Island DX Bulletin, Harvey McCoy, W2IYX, P.O. Box 173, Huntington, NY 11743-0876.

Long Skips, John Sklepkowycz, VE3IPR, P.O. Box 134, Station "S", Toronto, Ontario, Canada M5M 4L6.

QRZ DX, Bob Winn, W5KNE, P.O. Box 834072, Richardson, TX 75083.

The DX Bulletin, Jim Cain, K1TN, Burnap Brook Rd., Andover, CT 06232.

The DX News Sheet, B.J. McCartney, G4DYO, 123 Reading Rd., Finchampstead, Wokingham, Berks RG11 4RD, England.

In addition, we read Jim Smith's *DX Report, Papua/New Guinea;* the Western Washington DX Club's *Totem Tabloid,* edited by Jack Bock, K7ZR; the Northern California DX Club's DXer, edited by George Allan, WA6O; the *Carolina DXer,* edited by Murf Ratteree, W4WMQ; the DX column from NOFARS, the North Florida Amateur Radio Society; the DX column in *Florida Skip;* the *Southern California DX Club Bulletin;* and the very excellent DX column by John Minke, N6JM, in *World Radio.* Be aware that many club bulletins do not have the equipment and manpower to handle large mailings, so they restrict their circulation to members only. If you write to them, always enclose an SASE for their reply. Be informed!

DX Club News

Carolina DX Association: The Carolina DX Association announces that their 1985 officers have been returned to their posts for 1986. They are as follows: Ted Goldthorpe, WA4VCC, President; Robert Denton, KF4NO, Vice-President; Gary Bader, KD4RH, Secretary-Treasurer; Murphy Ratterree, W4WMQ, Bulletin Editor; and Hugh Campbell, N4AXT, Net Manager. The CDXA would like to invite Carolina area amateurs interested in increasing their DX totals to join the association. CDXA meets quarterly in the Charlotte, NC area. Amateurs are invited to use the CDXA repeater whenever they are in the area. A DX information net is held each Wednesday evening at 8:30 p.m. eastern time on the AA4SC/RPT 147.78/147.18 MHz. Visitors and nonmembers are welcome. For further information contact KD4RH at P.O. Box 3663, Rock Hill, SC 29730.

Madison, Wisconsin DX Club: 1986 officers are Frank L. Holliday, WB9NOV, President; Richard G. Burton, N9BAF, Vice-

Say You Saw It In CQ

The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee $2.00 (U.S.) for each mode, with no fees required for up-dates.

MIXED

2903	YU2DX	1790	N2AC	1516	WA1JMP	1156	CT1LN	923	VE5ADA
2853	F9RM	1782	SM7TV	1473	K6ZDL	1151	G4FAM	922	VE2PD
2614	K2VV	1756	I8YRK	1449	N5TV	1149	K2OLG	917	W6YMH
2574	W2NC	1675	I2PHN	1437	N6AW	1131	YU2CQ	901	W@JIE
2483	K6JG	1668	I6SF	1415	K8LJG	1110	SM@AJU	889	I@AOF
2357	VE3XN	1654	4X4FU	1322	N6JM	1090	N4IB	883	WI4K
2346	K6XP	1644	YU7AW	1283	KL7AF	1079	N8BJQ	865	NE6I
2209	W9DWQ	1637	I2PJA	1268	PY1APS	1074	K2POF	856	K7CU
2188	W4BQY	1634	W@SFU	1263	IS@LYN	1063	KC8CC	838	KX1A
2150	N4MM	1620	K9BG	1255	DK5AD	1052	3A2LF	824	PY1DFF
2077	YU2TW	1614	W9NUF	1231	W6OUL	1038	YU2CBK	820	W2XQ
2014	YU7BCD	1599	WA8YTM	1229	LA7JO	1028	W5PWG	799	KO2Q
1971	N6JV	1597	KF2O	1227	WB8ZRL	1025	WD9IIC	749	OE1KJW
1931	N9AF	1586	I3ZKD	1226	I2MQP	1016	N2AIF	663	KL7VZ
1869	K5UR	1572	YU7KV	1194	W7CB	1007	AI6Z	650	JO1BMV
1855	N4UU	1564	IN3ANE	1191	YU7AJD	997	SV1PL	640	N3KR
1792	YU1DZ	1518	K7NN	1189	JH1VRQ	995	KC2RS	615	K6UXO
1792	YU7BPQ	1516	PY4OD	1181	K2QF	934	WD4RAF		

SSB

2788	F9RM	1593	K5UR	1078	XE1OX	909	I@SGF	708	K9BQL
2408	I@ZV	1583	W4BQY	1075	I1POR	902	VE2PD	704	K8ZZU
2210	K2VV	1479	WF4V	1073	N6FX	896	WA2FKF	692	XF4MDX
2185	K6JG	1398	CT4NH	1060	TG9GI	896	PY4VX	687	W6YMH
2098	ZL3NS	1370	WA4QMQ	1045	KL7AF	895	N3IB	666	JA1XDA
2089	K6XP	1339	KF2O	1035	WB8ZRL	888	I5AFC	662	TI2KD
2070	I@AMU	1303	CT1FL	1033	KC8CC	884	W3GXK	662	VO1AW
2058	K2POA	1230	W9NUF	1029	N2AC	878	WI4K	659	I4UFH
1937	N4MM	1204	W3ARK	1017	I4LCK	863	W4UW	654	EA8AKN
1872	CT1UA	1204	G4CHP	1012	KC8YM	850	CT1BY	654	KX1A
1795	W@YDB	1199	N5TV	992	HI8GB	817	ON6IT	652	CP8HD
1751	I4ZSQ	1158	W2NC	967	LA2TO	810	IK5ACO	649	AI6Z
1699	WD8MGQ	1142	AC2J	950	PY4OD	767	K3IXD	646	OE5BGL
1688	OZ5EV	1130	NJ@C	948	KK@L	759	WB6SRK	621	AG2K
1657	YU7BCD	1091	KC4OV	943	CT4UW	748	KK5P	618	CT1BWY
1645	I8YRK	1083	ZP5JCY	935	XE1XF	744	EA5BCX	615	N2AIF
1633	I2PJA	1079	I8KCI	933	K8LJG	715	I8WYD	611	KE6KT
1605	W9DWQ	1078	ZP5RS	921	K5RPC	714	SM@AJU		

CW

2346	W2NC	1589	YU7SF	1162	I2DMK	811	N2AIF	661	VE4AEX
2066	K2VV	1551	N2AC	1159	N6FX	800	JH1VRQ	655	LA7JO
1958	N7JV	1486	N4MM	1147	N5TV	788	YU2CQ	654	W@JIE
1950	WA2GZR	1482	K5UR	1130	JE1JKL	751	VE1ACK	647	WB8ZRL
1895	W@YDB	1446	VO1AW	1122	KA7T	748	SM5DAC	646	TI4BGA
1877	K6JG	1436	I6SF	1059	IT9VDQ	725	SM@AJU	645	PA3CKO
1836	W3ARK	1422	LZ1XL	990	K8LJG	717	F6HKD	643	N4IB
1834	W9DWQ	1329	W4WJ	943	KL7AF	692	KN7K	628	W6YMH
1739	K6XP	1290	K9QVB	919	K2POF	689	OE1KJW	614	KQ8J
1734	W4BQY	1287	PY4OD	909	DJ1YH	669	ZS6BCR	606	JA2GCW
1701	G2GM	1219	W9NUF	852	I7PXV	667	W2XQ	604	NE6I
1648	VE7CNE	1194	I1YRL	846	AK2H	663	W9PWM	603	I8YRK
1608	YU7BCD	1177	K6ZDL	818	AI6Z				

President; and Bernard J. Albright, N9EJL, Secretary-Treasurer.

North Jersey DX Association: Officers for 1986 are Elliott L. Shwartz, W2DIE, President; Edward J. Bizub, Sr., WA2CBB, Vice-President; John P. Dowd, W2GK, Secretary; and Vernon E. Clifford, W2SN, Treasurer.

Virginia Century Club: 1986 officers are James L. Young, K4JDJ, President; Frank A. Palacky, KE4SN, Vice-President; and Charles M. Hartzell, W4KHW, Secretary-Treasurer.

Western Pennsylvania DX Association: Officers for 1986 are Mike Zilavy, KC3MR, President; Al Houston, N2MA, Vice-President; Jan Ditzian, KX2A, Secretary; Don McDaniel, KJ3Q, Treasurer; John Getz, AD8J, Newsletter Editor; Mike Chepponis, K3MC, Technical Adviser; and Doug Stark, WA3CGE, DX Information.

Western Washington DX Club: WWDXC, the world's largest DX club, has the following officers for 1986: John Gohndrone, N7TT, President; Andrew Isar, NN7L, Vice-President; Jack Wichels, W7YF, Secretary; Mike Sedgwick, WA7BPI, Treasurer; and Trustees Bob Preston, W7TSQ, Frank Waxham, K7DS, and Morris Shepherd, W7LVI.

Rare Prefixes and Special-Event Stations

CU8, Flores Island: CU8AA was operated by CU2AK, CU3AA, and CU3AD during the ARRL CW DX test in March.

EK@: EK@DR and EK@GZ were active from the USSR Komsololskaya expedition to the Arctic. QSLs go to RW3DR.

FB1: This prefix is assigned to France instead of French Antarctic possessions. FB stations in France are limited to 20 watts.

William A. Wilson, K6ARO, U.S. Ambassador to the Holy See, at the mike of the Vatican Radio Station. Bill had the honor and pleasure of being the first to go on the air with the new HV1CN station after it was dedicated. He reports being drowned in calls when he finished the first QSO.

GB2: GB2SDD was a special station for St. David's Day in Wales and was active Feb. 28 and March 1. A special diploma is available to those who contacted GB2SDD and five other Welsh stations.

GU4: GU4WTN was a special-event station operated by the British Royal Navy. QSL via the Radio Society of Great Britain (RSGB).

P4: This is the new prefix for Aruba and is now in wide use.

TV5 and TV6: TV5SDP and TV6SDP operated from a telecommunications exhibition in Salon-de-Provence, France. TV6BFI is a special call used in the town of Annonay, France from Feb. 20 to June 30, 1986 to celebrate the bicentenary of the birth of the French engineer, Marc Sequin.

ZF8 and ZF9: Effective Jan. 1, 1986, ZF8 became the official prefix for Little Cayman Island and ZF9 became the official prefix for Cayman Brac.

9K25: This prefix was used from Feb. 22–28, 1986 to commemorate the 25th anniversary of the National Day of Kuwait.

Here and There

Mail a Problem? If you have a complaint with your mail service, you can help the U.S. Postal Service by filing a Consumer Service Card, PS Form 4314C. The complaint card is a registered, postage-free, multicopy form. One copy is sent to the local postmaster, one goes to Washington, D.C., the third to the U.S. Postal Service Consumer Offices in St. Louis, MO, and you keep the fourth. To get a Consumer Service Card, contact your local postal authorities or write to the Consumer Service Offices, St. Louis, MO 63155-9993. (*Tnx WB6WKM in the Northern California DX Club's "The DXer."*)

WAZ: Jim Smith, P29JS, recently worked WAZ in 16 days on the 20 meter band. This shows that DX can still be found despite the low sunspot numbers.

If you need Zone 2 for your 5-Band WAZ or 80 Meter Single Band WAZ, listen for VO2AE, who frequently checks into the CJ Net on 3775 kHz at 2330 UTC.

CQ DX Awards Program

SSB

1465	WB6OKK	1469	EI9FE
1466	WA2MID	1470	NW5K
1467	YC0BLO	1471	EA2SN
1468	KE6KT		

CW

658	WP4D	660	JA1OJZ
659	K2JLA		

SSB Endorsements

310	4Z4DX/315	300	W6BCQ/300
310	N7RO/314	275	KA9ABC/295
310	W3GG/314	275	K9MNT/285
310	VE3XN/314	275	W6YQ/281
310	LU3YL/312	250	WB6OKK/272
300	W2CC/308	250	KF3C/261
300	NY5L/304	150	EA8AKN/157
300	WA2MID/300	QRPp	EA2SN
300	NW5K/300		

CW Endorsements

300	SM6CST/308	200	WP4D/225

Total number of active countries is 315. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

For Zone 23 on 40 meters, JT0XC was reported on 7003 kHz at 0150 UTC and UA0YM and RU0YF were heard on 7006 and 7015 kHz, respectively, in the 0230 to 0250 UTC time frame.

ON7IP/ST2 will be active from the Sudan, Zone 34, until July. QSL to his home address.

Long Skip: Congratulations to John Sklepkowycz, VE3IPR, on becoming editor of "Long Skip," the publication of the Canadian DX Association, and best wishes to Gary Hammond, VE3XN, who did an excellent job as editor for the last several years.

Where the Hams Are: According to the IARU, the following are the top 10 countries in the world in terms of the total number of amateur radio stations. The order would change somewhat if number of operators was used as the criterion instead of stations. We chose to report stations, as there isn't a number shown for the total operators in Japan.

Country	Total Number of Stations
Japan	574,581
U.S.A.	415,000
Brazil	56,000
West Germany	53,860
United Kingdom	53,000
USSR	45,000*
Argentina	35,000
Italy	26,250
Spain	26,000
Canada	22,967

**The USSR lists 75,500 licensed operators and 140,000 society members.*

DX Information Net: For the latest DX with a European slant, tune in the DX information net operated Saturdays from 1400–1530 UTC on 14212 kHz by SV1PL and EA6MR.

New DX Publication: Art Hubert, N2AU, publishes a new weekly bulletin called "Inside DX." He uses a format similar to that formerly used by Alan Leith in his "DX Report," which recently ceased publication. For subscription info write to Art at 436 N. Genveva St., Ithaca, NY 14850.

Some Rare Countries: K8CRM/KH3 visits Johnston Island weekly on an irregular schedule. It is reported that 7030 kHz at 0800 UTC is a good frequency and time to listen for him.

ZL8OY is scheduled to be on Kermadec until August or September. When 10 meters is open, 28,365 kHz is a good listening frequency.

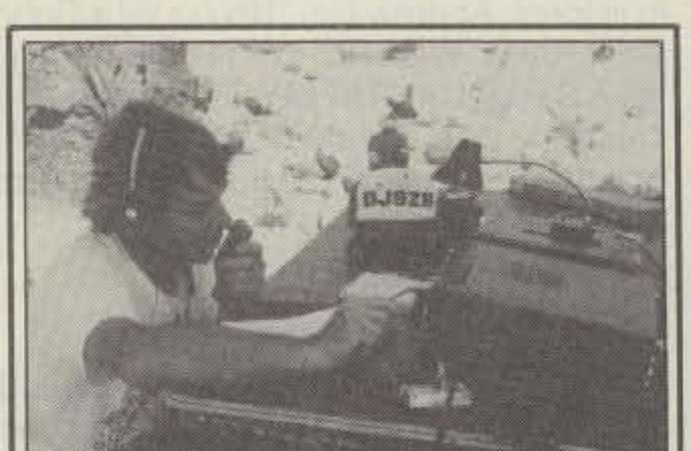
The DX Family Foundation of Japan printed and shipped 3,000 YI1BGD QSL cards to Bagdhad. This should help with YI1 confirmations.

Mike Smedal, ex-A71AD, is reported to be active from 5B4 Cyprus. He will undoubtedly clear up the need for this country. QSL Mike to P.O. Box 7180, Nicosia, Cyprus.

Clipperton Island

FO0, Clipperton, is one of the most interesting of the very rare DX countries. It has a long tradition on the countries list, but is seldom visited because of its remote location in the Pacific and its "lack of amenities." A DXpedition to Clipperton does not set up on the top floor of the downtown Hilton.

The most recent DXpedition to Clipperton occurred in the spring of 1985. Its members included K3NA, F9LX, N6GJ, JG3LZG, FO8AW, W8TN, F6GXB, KK6X, W6RGG, FO8HL, WA7NIN, XE1ZZA, and DJ9ZB, a truly international group representing six DXCC countries. The event was chronicled by Franz, DJ9ZB, a member of the CQ DX Hall of Fame and a man without peer in the preparation of picture logs of his DXpeditions. Franz sent us a copy of the book from the 1985 Clipperton trip, for which we are grateful. The callsign for this trip was FO0XX and the Northern California DX Foundation was a major sponsor. The book begins with a description of the history and geography of Clipperton, which we feel is sufficiently interesting to quote in the column:



Franz Langner, DJ9ZB, operating from Clipperton during the FO0XX DXpedition in 1985. Franz was elected to the DX Hall of Fame in 1982. (See the writeup on Clipperton in this column.)

"Clipperton—the forgotten island—is a small atoll about 5 miles in diameter which is located in the southeast Pacific Ocean about 1800 miles west of the Panama Canal (10 degrees, 13 minutes north, 109 degrees, 13 minutes west). It is administered by France and is considered a part of French Polynesia.

"Clipperton is uninhabited. It is roughly circular in shape and in most places the island's elevation is barely 10 feet. The most prominent feature of the island is Clipperton Rock, an 82-foot rock topped by the remains of an old lighthouse installed by the Mexican government in the early 1900's. The rock resembles the white sail of a ship when one first approaches the island. Vegetation consists of low scrubby grass and bushes and a few coconut palms. Birds and crabs are the predominant wildlife.

"Since its discovery in 1527 by Don Alvaro de Saavedra, one of Cortez's captains, the ownership of the island has often been in dispute. In 1705 it was used as a base by the English pirate John Clipperton to raid Spanish treasure ships traveling between Peru and Panama, hence the name Clipperton. Two French vessels visited in 1711 and knowing nothing about Clipperton claimed it for France as Ile de la Passion (Passion Island). In 1853, the island was claimed again for France by Lieutenant Kerguelen, but Mexico immediately protested that Clipperton has been hers since the days of Cortez. Then, based on the Guano Act of 1856, the United States laid claim to Clipperton and several other Pacific islands. In 1897, a French ship was sent to Clipperton to reassert French sovereignty only to find the U.S. Stars and Stripes flying over the island and during the following year a Mexican gunboat visited the island. England claimed Clipperton in 1906 based on the original claim of John Clipperton in 1706.

"In order to settle the sovereignty issue, France requested that King Victor Emannuel of Italy arbitrate the dispute. In 1931—22 years later—Victor Emannuel startled the world (including the French government which had forgotten about Clipperton) by announcing that the island truly belonged to France. However, it wasn't until the mid-1930's that the flag of France was finally planted on Clipperton, but the last shoveful of guano had already been removed, leaving the island almost worthless.

"Clipperton is uninhabited and has been for most of its history. Mexico occupied the island for probably its longest and most tragic period. In 1908 the Mexican government sent a small garrison of soldiers commanded by Captain Ramon de Arnaud to reassert its claim of sovereignty over the atoll. The party totalled 30 persons including 10 soldiers and the wives and children of the garrison and were to be provisioned by supply ships every 4–5 months. Unfortunately, the party in power in Mexico was forced out by a revolution and the garrison was forgotten. A few survived on lizards, snails and fish until they were discovered in 1917 by the U.S.S. Yorktown on patrol for German raiders.

"The only known attempt to colonize the island occurred prior to 1954 when a religious group from the Fiji Islands moved to Clipperton with the intent of forming a religious community. Unfortunately, the fruit trees they hoped to raise would not grow in the salty environment.

"Other groups have also visited the island from time to time. Guano diggers were there prior to 1900 and in 1939 the Australian aviator

Say You Saw It In CQ

From left to right are J.E. Rumble, VK6RU, and Gary Dixon, K4MQG, during a recent visit by VK6RU to Gary's QTH. K4MQG was the first U.S. DXer, and the second worldwide, to earn a 5-Band WAZ award. (Tnx W4WMQ)

Captain Patrick Gordon Taylor twice landed his seaplane in the lagoon while surveying for refueling stops for aircraft. From 1943–45, the U.S. Navy maintained a weather station and possibly a radar installation as part of the defense scheme for the Panama Canal. In addition, there is an unconfirmed story that the Japanese had a base on Clipperton early in World War II. The island was visited in 1958, during the International Geophysical Year, by scientific groups and in 1978 Jacques Cousteau visited and filmed a TV documentary.

"Amateur radio activity has occurred on 4 different occasions. The first group was led by Bob Denniston, W0DX/VP2VL, who made 1108 contacts from Clipperton in 1954 using the call FO8AJ. The next visit was by Danny Weil, VP2VB, as part of his round the world DXpedition, followed by Doug McGill, W6KSJ, who made about 2000 contacts during the International Geophysical Year. The last radio operation was carried out by a group of Swiss, French and U.S. operators in March 1978 using callsigns in the FO0X series."—*Tks Franz.*

73, John, K4IIF

QSL Information

A22BW to DK3KD
A71BK to N5GAP
AH6GJ to WA9AEA, 501 N. Hill St., McHenry, IL 60050
AP2SK/9N to P.O. Box 202, Katmandu, Nepal
BV2BG to W3USS
BV2FA to DJ9ZB
C53AA (The Gambia) to OH2BBM
C53EK to K6HCJ
CE9AM (South Shetlands) to CE3EEO
CV0D to CX1AA
EL2AY to N5GAP
FM5BH to W3HNK
HC1OT to W2KF
HK0BKX to WB9NUL
HS0A to Box 2008, Bangkok, Thailand
HU1DX to WA0JYJ
HZ1HZ to N7RO
J37AH to WB2LCH
J52UAG to YU7AHI
J88AQ to W2MIG
JW6VAA to LA4YW
KH6RS (Maui ARC) to AH6AZ
KH0AC to K7ZA
N9AG/V2A to W8UMD
OA1A/KP2 to K5TVC
PY1CRP/PQ0 to PY1DFF
SU to (Egyptian Amateur Radio Society, 18 El-Abnasi St., Manchiet El-Bakri, Cairo, Egypt
TR8AH0 to DL1PO
TR8DR to W2PD
TU2NG to N5GAP
VK9ZB to VK6YL
VP8WTW to G4ZCN
VQ9DM to W4OM
WB9CIF/V2A to W8UMD
YI1BGD to Box 6100, Bagdad, Iraq
ZD7SE to KA1DE
ZD9BV to W4FRU
ZF2AF to W0GI
ZF2FK to K9QVB
ZS3Z to ZS6BCR
ZS4PB to WA3HUP
3D6BW to AK1E
3D6QL to YASME Foundation, Box 2025, Castro Valley, CA 94546
4U1UN to W2MZV
5H3CE to IK6BOB
5R8AL to WA4UDE
5T5SL to DL8DF
6W1LL to DL1HH
6W1NQ to DL1HH
6W6NJ to N5GAP
8P6DH to W2FLO
8P9AG to K6ZM
8P9AK to AK6T
9G2XX to Box 6437, Accra, Ghana
9J2BO to W6ORD
9J2BH to G3ZXY
9L1AH to Box 10, Freetown, Sierra Leone
9M8GH to Box 2870, Kuching, Sarawak
9N1MM to N7EB
9Q5CT to AK1E
9N1NR to W4SKE
9X5VA to W2PPG
9X5WB & 9X5WP to WB6VKD
9Y4E to WA4WTG
9Y4F to W3HNK
9Y4VE to VE3GCO

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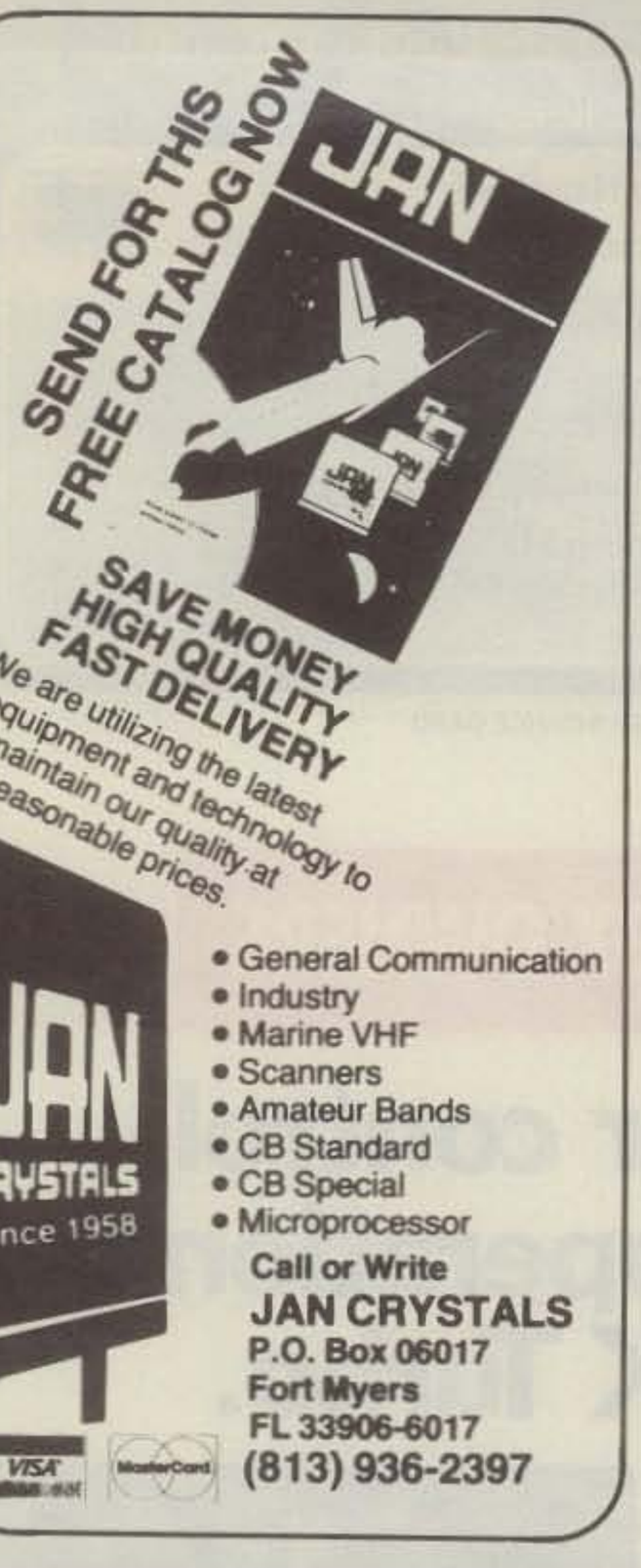

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1985 CQ WW DX SSB Contest High-Claimed Scores

The following are SSB high-claimed scores. These are raw scores only, subject to verification.

USA
Single Operator
All Band

K1DG	3,030,797
W3BGN	3,007,780
N2LT	2,468,575
N2FB	2,321,560
KE2C	2,211,978
AK1A	2,181,780
K4ISV	2,136,064
KS1L	2,059,176
W1WEF	1,927,791
KB3TN	1,905,264
K2TR	1,896,102
K3WW	1,805,650
K1KI	1,798,004
K4JPD	1,633,275
KM1C	1,561,782
KM6B	1,539,570
N2RM	1,526,408
N3AD	1,521,195
K1VR	1,469,286
WS4Q	1,382,800
W0JLC	1,363,635
N9AG	1,242,885
K2VV	1,051,085

Single Band
1.8 MHz

N0XA	11,880
K5UR	11,760
AA4MM	6,705
W2FCR	3,751
W6US	2,790
KA1SR	2,210
N8EA	1,782
W3GG	1,716

3.8 MHz

W6MKB	75,060
WB2ITR	66,256
N8ATR	56,500
N6AR/4	49,728
K2RR	46,640
K0KX	46,410
NA2R	21,316
W7IVX	20,522

7 MHz

KV0Q	89,232
KA5W	70,567
NB1G	60,424
W8SH	52,164
K2UU	50,736
WB8BJM	46,460
KB0U	42,400
K4LTA	26,292
K1MM	25,112
NF7S	24,678
K8IA	23,016

14 MHz

K1OX	1,132,912
K3RV	914,132
K1UO	878,472
KA1GG	565,136
K2HFX	555,256
K9BN	467,390
N7TT	424,168
KV4P	332,904
KE7C	308,826
W1GD	291,526
K5TSQ	275,886
WB4FLB	234,112
W7FP	223,790
N7US	164,920

21 MHz

K2EK	851,196
N8II	729,964
W6YA	490,314
KE5FI	473,850
W5VX	396,582
K6SVL	347,996
NI0E	257,175
K1VUT	204,820
W8HRV	182,685
N4BP	176,530
WB3ICL	139,319

28 MHz

KG1E	71,688
WC4E	30,456
KR9G	13,052
KR1R	12,083
K7QQ	10,726
WB5CRG	10,120
W3KHQ	10,080

Multi-Operator
Single Transmitter

KX4S	4,603,120
N4WW	3,820,452
K3TUP	3,816,676
W8UA	3,368,700
KS9K	3,354,678
K1NG	3,108,586
K3KG	3,070,728
N4ZC	2,938,059
K2BU	2,643,134
K2NJ	2,168,432
N6ND	2,069,163
W2HPF	1,934,752
W9RE	1,813,020
N8CXX	1,721,340
K3NZ	1,509,816
NB1H	1,489,488
W8GWC	1,450,440
N2MM	1,442,560
W6XJ	1,337,490
KM9L	1,118,439

Multi-Operator
Multi-Transmitter

W3LPL	8,302,536
N5AU	7,864,071
NR5M	6,059,036
AD8P	5,671,096
N4RJ	5,324,730
N6RO	4,422,684
N6TU	3,712,760
NF2L	2,930,103
K3ZZ	2,490,416
W3GM	2,248,460
ND0E	2,171,526

QRPp
All Band

K7RI	271,122
NZ5A	74,983
KB7VD	23,872

World
Single Operator
All Band

PJ2FR	9,613,615
P43A	9,441,850
8R1Z	9,268,467
EA9IE	6,539,608
J87DX	5,826,912
OH1RY/C56	4,355,328
CE3FIP	4,019,520
GW4BLE	3,221,380
WB6FCR/KH6	3,187,440
VE6OU/3	3,184,461
F6BEE	2,873,136
9U5JB	2,841,770
CQ0NH	2,654,405
TR8JLD	2,602,478
IO6FLD	2,456,040
LU1BR	2,373,643
IV3PRK	2,315,690
VE3XN	2,119,312
DL8PC	2,064,053
OK2FD	2,001,774
RF0FWW	1,895,674
D44BC	1,869,076
CE3DNP	1,864,800
JH7LRS	1,773,772
ZS3IL	1,701,394
W5WMU/C6A	1,687,437
JA1YFG	1,516,626
JA0JHA	1,514,656
K3UOC/YV4	1,432,353
TU4BR	1,402,770
DJ0UJ	1,373,535
DK3GI	1,218,323

Single Band
1.8 MHz

LZ2CJ	93,536
KH6CC	52,416
VE3NNR	47,880
IO4YSS	26,796
VE3OME	26,375
IK0BYO	18,354
UG6GAW	17,202
F9KP	15,188
G4UBK	15,008

3.8 MHz

VE3BMV	393,530
VE2HQ	313,530
T32AF	222,768
J87J	212,403
YW5A	200,361
4N3E	162,628
PA2TMS	151,956
UP2BIM	138,012
DK8NG	132,613
YU3NA	112,270
VE1VIC	112,192

7 MHz

VP2ET	850,795
TI2CC	823,480
J87A	573,931
IT9GSF/IG9	335,088
JA5BJC	310,905
CE8ABF	304,400
ZS6BCR	296,537
HA9RE	275,080
I5FCK	258,054
UH8EC	249,375
UA1DZ	234,232
UM8MO	210,540
JA2BAY	191,976
ZS6G	164,154
KL7RA	157,157
LZ2BE	143,290
VE2FU	126,549
G3RRS	121,000
UB5IFN	119,808
UF6VB	113,129
JH1YDT	112,623
EA2QU	106,380

14 MHz

YZ9A	1,370,096
G3FXB	1,217,178
OH8OS	983,808
VE3CPA	971,442
OH8OS	957,408
DL8NU	895,685
I4RYC	894,200
YU7XX	892,944
YT3M	882,090
HC1OT	847,872
I5MKX	843,495
CX7BY	832,572
OH8PF	779,086
OH1AF	730,296
I6NOA	711,672
JE6MQW	701,901
PY4OD	687,450
OH1AA	659,680
UB5IRM	618,096
RB5DX	596,095
K8MN/OH2	577,752
EA3AQC	518,518
AL7CQ	486,860
UB5WE	467,460
OZ1BTE	454,528
Y23DL	442,068

21 MHz

TI2CF	1,341,642
KG6DX	1,316,304
LU2FDR	1,063,022
CE6EZ	1,009,355
YT3L	974,780
RB5FF	690,523
I1KN	668,000
ZY5NW	667,275
L4D	638,048
CX8BBH	613,564
JI1CBF	598,560
9Y4VU	574,203
YC0DNK	570,900
IT9KZW	533,956
HC1EA	472,605
OH2BR	462,024
UA4PO	426,122
ED1CI	371,460
OH8VJ	323,584
WH6W	301,184
4X5NM	277,478
YO9HT	267,264
VE2PJ	252,518
IT9GCQ	237,534
JF6PPQ	226,084
RB5GW	225,967
C53EK	222,750

28 MHz

LU1E	554,840
TI2KD	553,600
LU1FUW	265,236
LU4MEE	233,766
YV5JEM/6	155,316
CX2AAL	137,428
L4H	133,381
4X4VL	124,068
VE1BNN	110,638
EA8AMT	96,459
EA8VV	83,520
YU7EE	80,028
CE6DAQ	74,130

Multi-Operator
Single Transmitter

P44B	11,315,931
I5NPH	9,689,750
ZZ5EG	9,041,040
KP4BZ	7,015,554
YZ1EXY	6,877,504
OK5R	6,682,236
HG5A	6,281,793
ED7BB	6,128,774
OH0BA	5,961,600
VE3BVD	5,921,580
HG9R	5,695,882
Y24UK	5,594,564
VE3XO	5,384,132
HG6N	5,359,692
HG7B	5,138,670
OK5W	4,598,342
ZP5JCY	4,440,744
GJ6UW	4,430,010
RL8PYL	4,410,170
GW8GT	4,155,624
HB0BHA	3,630,440
KH6DW	3,603,882
UZ4FWO	3,501,172
ZS6BPL	3,255,282
G3LNS	3,206,240
XQ0ZFZ	3,098,288
VP2MU	3,081,260
JH7YJF	2,756,600
UP1BZZ	2,743,873
YT2R	2,714,631
4N4C	2,697,534
UQ1GXN	2,696,958
JA3YBF	2,626,992
OK3KII	2,589,455
I2UBI	2,535,343
ED6MDX	2,429,856
KB6DAW/KH9	2,428,344
HB9ACA	2,425,350
EA8OZ	2,401,992
HS0A	2,341,476
HB9H	2,334,163
3D6DX	2,122,848
HA5KKC	2,075,570
JA1YBK	2,025,400

Multi-Operator
Multi-Transmitter

HC8X	22,031,611
VP2VCW	19,846,800
VP9AD	18,029,220
VP2MW	15,278,868
IO3MAU	9,556,680
LX9BV	8,156,576
4U1ITU	4,948,137
KL7Y	4,222,866
JA7YFB	3,678,762
HB0AON	3,674,352
VE7ZZZ	3,252,515
JA2YRR	2,598,960
JA3YKC	2,056,227

QRPp
All Band

WP4G	342,382
JA1WSK	115,062
YU1NR	114,912
OK3IAG	95,966
SM5CCT	78,892
UY5XE	78,857
LZ2EW	77,700
OK1DKS	66,171
SP2UUU	62,730
JA2JSF	42,978
KH6CP	41,747
EA4DQD	25,398
ZL1BIL	16,704

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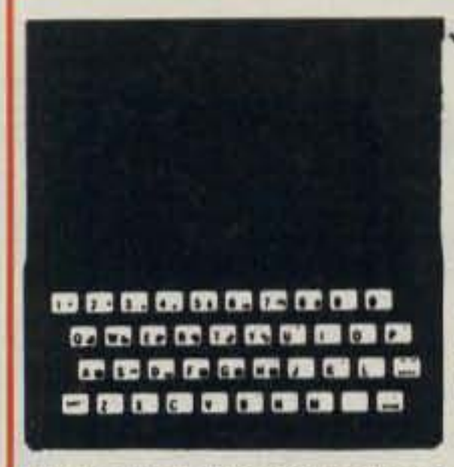

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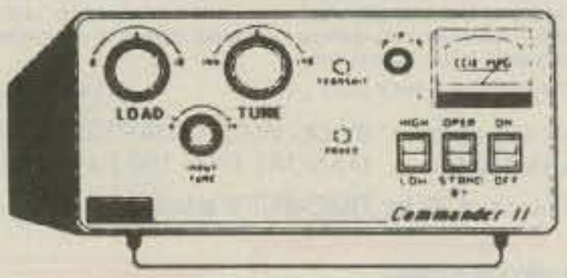

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CIRCLE 60 ON READER SERVICE CARD

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

New Cycle Spots Sighted

The Space Environment Services Center of the U.S. Dept. of Commerce at Boulder, Colorado has reported that the first sunspots of what will be the next solar cycle (Cycle 22) have been sighted. While sunspots from Cycle 21 are still occurring near the solar equator, the spots from the upcoming new cycle are seen at higher solar latitudes and with reversed polarity of the magnetic fields which surround them. This is an observable pattern on the sun itself that confirms that the end of one cycle is near and that a new cycle will soon begin. Scientifically, the date for the ending of one cycle and the beginning of a new cycle is now taken as the month during which the spots associated with the old cycle are approximately equal to the number of spots seen from the new cycle. If the present rate of decrease in old cycle spots continues, with a corresponding increase in new cycle spots, the changeover date from Cycle 21 to Cycle 22 is likely to occur by the end of this year.

The Royal Observatory of Belgium reports a monthly mean sunspot number of 23.6 for February 1986. The highest level of solar activity occurred on February 4th with a count of 58, while the sun was devoid of spots between February 16 and 19. This results in a smoothed sunspot number of 17 centered on August 1985 as the present sunspot cycle continues to decline much as expected. A smoothed sunspot number of 8 is forecast for June 1986.

The Royal Observatory also reported the official monthly mean sunspot numbers for 1985 as follows:

Jan.—16.5	July—30.7
Feb.—15.9	Aug.—11.1
Mar.—17.2	Sept.—3.9
Apr.—16.2	Oct.—18.6
May—27.5	Nov.—16.2
June—24.2	Dec.—17.3

The yearly mean for 1985 was 17.9.

June Propagation

Twenty meters looks like it should be the best band for DX propagation during June. Expect it to open just after sunrise and to remain open for a few hours in almost all directions. When conditions are Low Normal or better, chances are good for openings to Europe, Central and South America, the South Pacific, Australasia, and the Far East, before noontime absorption sets in. A second, and usually stronger, peak is expected during the late afternoon, when good openings should be possible towards Europe, Africa, Central and South America, and the Middle East. After sunset and until midnight look for good openings to South America, Antarctica, the South Pacific, Australasia, and the Far East. When conditions are High Normal or better, there may also be post-sundown openings on *20* meters to Europe, Africa, and the Middle East.

Not too much DX is expected on *15* meters this month, but some should be possible. When conditions are at least Low Normal, expect fairly good openings towards Central and South America as early as 9 a.m. Best time for these openings, however, should be during the afternoon hours and possibly as late as the sundown period. The band may also open occasionally from the eastern half of the United States towards Africa, and from the western half towards the South Pacific, Australasia, and the Far East. Best time to check for these openings is during the afternoon hours, especially when conditions are High Normal or better.

Few if any DX openings are expected on *10* meters, except to those areas of the Caribbean and Central America within a 1300-mile range of short-skip sporadic-*E* openings from the USA. An occasional longer opening to South America may be possible during the late afternoon hours when conditions are High Normal or better.

Longer hours of daylight and seasonally higher levels of static should reduce considerably the chances for DX openings on *40*, *80*, and *160* meters. Some fairly good openings, however, are forecast to several areas of the world for *40* meters during the hours of darkness and the sunrise period. Somewhat fewer, but often good, openings should also be possible on *80* meters during much of the same time period.

Plenty of good short-skip openings are expected on the HF bands during June. For distances less than 250 miles try *80*

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for June 1986

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 15, 18	A	A	B	C
High Normal: 4, 11, 14, 16-17, 24, 26, 30	A	B	C	C-D
Low Normal: 1-3, 5-6, 9-10, 12-13, 19, 23, 25, 28-29	A-B	B-C	C-D	D-E
Below Normal: 7-8, 20, 22, 27	B-C	C-D	D-E	E
Disturbed: 21	C-E	D-E	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be fair-to-good (B-C) on June 1st through the 3rd, good (B) on the 4th, fair-to-good (B-C) on the 5th & 6th, and so on.

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart approprate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8 KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. A ** indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:
(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days
Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *daylight* time is used, *not GMT*. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado, 80302.

June 15 - August 15, 1986
Time Zone: PDT (24-Hour Time)
WESTERN USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe & North Africa	13-18 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	19-21 (1) 21-22 (2) 22-00 (3) 00-01 (2) 01-02 (1)	21-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Northern Europe & European USSR	*Nil*	06-07 (1) 07-09 (2) 09-15 (1) 15-18 (2) 18-19 (3) 19-22 (2) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1)	21-23 (1)
Eastern Mediter-ranean Middle East	11-13 (1) 16-17 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-06 (1) 06-08 (2) 08-09 (1)	20-22 (1) 22-00 (2) 00-01 (1)	22-00 (1)
Western Africa	11-14 (1) 14-17 (2) 17-18 (1)	05-06 (1) 06-07 (2) 07-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-01 (1)	20-22 (1) 22-01 (2) 01-02 (1)	21-01 (1)
Eastern & Central Africa	11-16 (1)	16-18 (1) 18-20 (2) 20-21 (1)	22-00 (1)	22-00 (1)
Southern Africa	11-13 (1)	01-03 (1) 05-07 (1) 15-16 (1) 16-18 (2) 18-19 (1)	20-21 (1) 21-01 (2) 01-02 (1)	22-01 (1)* 23-01 (1)*
Central & South Asia	*Nil*	07-10 (1) 20-23 (1)	05-07 (1) 20-22 (1)	*Nil*
South-east Asia	*Nil*	07-10 (1) 19-23 (1)	*Nil*	*Nil*
Far East	*Nil*	07-08 (1) 08-10 (2) 10-12 (1) 20-23 (1)	04-06 (1)	*Nil*
South Pacific & New Zealand	19-22 (1)	19-21 (1) 21-01 (2) 01-07 (1) 07-10 (2) 10-12 (1)	02-03 (1) 03-06 (2) 06-07 (1)	03-06 (1) 03-05 (1)*
Austral-asia	19-22 (1)	06-08 (1) 08-09 (2) 09-12 (1) 17-19 (1) 21-23 (1) 23-01 (2) 01-04 (1)	03-04 (1) 04-06 (2) 06-07 (1)	03-06 (1)
Carib-bean, Central America & North-ern Countries of South America	15-17 (1)** 09-12 (1) 12-15 (2) 15-18 (3) 18-20 (2) 20-21 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-16 (2) 16-18 (3) 18-21 (4) 21-23 (3) 23-00 (2) 00-02 (1)	20-22 (1) 22-23 (2) 23-03 (3) 03-05 (2) 05-07 (1)	22-00 (1) 00-04 (2) 04-06 (1) 02-05 (1)*
Peru, Bolivia, Para-guay, Brazil, Chile, Argen-tina & Uruguay	14-17 (1)** 09-12 (1) 12-15 (2) 15-17 (3) 17-19 (2) 19-20 (1)	06-08 (1) 08-09 (2) 09-15 (1) 15-17 (2) 17-19 (3) 19-20 (4) 20-22 (3) 22-00 (2) 00-04 (1)	21-23 (1) 23-03 (2) 03-06 (1)	00-05 (1) 01-04 (1)*
McMurdo Sound, Antarc-tica	*Nil*	20-22 (1) 22-00 (2) 00-02 (1)	00-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)

June 15 - August 15, 1986
Time Zones: CDT & MDT
(24-Hour Time)
CENTRAL USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Central Europe & North Africa	13-17 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-21 (1)	20-22 (1) 22-00 (2) 00-02 (1)	21-00 (1)
Northern Europe & European USSR	*Nil*	06-07 (1) 07-09 (2) 09-14 (1) 14-17 (2) 17-20 (1) 20-22 (2) 22-23 (1)	20-23 (1)	21-23 (1)
Eastern Mediter-ranean & Middle East	*Nil*	07-09 (1) 14-15 (1) 15-17 (2) 17-19 (1) 19-21 (2) 21-22 (1)	20-23 (1)	*Nil*
Western Africa	14-16 (1)	06-08 (1) 13-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-21 (1)	20-00 (1)	21-23 (1)
Eastern & Central Africa	*Nil*	16-18 (1) 18-20 (2) 20-21 (1)	20-23 (1)	*Nil*
Southern Africa	10-12 (1)	05-07 (1) 14-15 (1) 15-17 (2) 17-18 (1) 22-00 (1)	21-23 (1) 23-00 (2) 00-01 (1)	22-00 (1)
Central & South Asia	*Nil*	09-11 (1) 18-20 (1) 20-22 (2) 22-00 (1)	05-07 (1) 19-21 (1)	*Nil*
South-east Asia	19-21 (1)	08-10 (1) 20-21 (1) 21-23 (2) 23-00 (1)	05-07 (1)	*Nil*
Far East	20-22 (1)	07-08 (1) 08-11 (2) 11-21 (1) 21-23 (2) 23-01 (1)	04-07 (1)	04-06 (1)
South Pacific & New Zealand	15-19 (1) 19-21 (2) 21-22 (1)	17-19 (1) 19-22 (2) 22-00 (3) 00-02 (2) 02-07 (1) 07-10 (2) 10-14 (1)	01-03 (1) 03-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	01-04 (1) 04-05 (2) 05-06 (1) 03-05 (1)*
Austral-asia	16-18 (1) 20-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 15-17 (1) 20-22 (1) 22-00 (3) 00-02 (2) 02-04 (1)	01-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)
Carib-bean, Central America & North-ern Countries of South America	15-18 (1)** 09-13 (1) 13-15 (2) 15-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-16 (2) 16-18 (3) 18-20 (4) 20-22 (3) 22-00 (2) 00-02 (1)	20-22 (1) 22-23 (2) 23-03 (3) 03-05 (2) 05-06 (1)	22-00 (1) 00-04 (2) 04-05 (1) 00-04 (1)*
Peru, Bolivia, Para-guay, Brazil, Chile, Argen-tina & Uruguay	14-17 (1)** 09-12 (1) 12-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-02 (1)	21-23 (1) 23-03 (2) 03-05 (1)	22-04 (1) 00-03 (1)*
McMurdo Sound, Antarc-tica	*Nil*	18-21 (1) 21-23 (2) 23-01 (1)	22-04 (1) 04-06 (2) 06-07 (1)	04-06 (1)

June 15 - August 15, 1986
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	15 Meters	20 Meters	40 Meters	80 Meters
Western & Southern Europe & North Africa	*Nil*	06-07 (1) 07-08 (2) 08-14 (1) 14-17 (2) 17-19 (1) 22-00 (1)	20-23 (1)	*Nil*
Central & Northern Europe & European USSR	*Nil*	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-18 (1) 21-23 (1)	20-22 (1)	*Nil*
Eastern Mediter-ranean & Middle East	*Nil*	06-08 (1) 14-16 (1) 19-20 (1) 20-21 (2) 21-22 (1)	20-22 (1)	*Nil*
Western Africa	10-14 (1)	07-09 (1) 14-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	20-23 (1)	*Nil*
Eastern & Central Africa	*Nil*	14-16 (1) 16-18 (2) 18-19 (1) 06-08 (1)	*Nil*	*Nil*
Southern Africa	*Nil*	06-08 (1) 13-16 (1) 22-00 (1)	20-21 (1) 21-22 (2) 22-23 (1)	20-22 (1)
Central & South Asia	*Nil*	07-08 (1) 08-10 (2) 10-11 (1) 18-20 (1) 20-22 (2) 22-23 (1)	05-07 (1) 18-20 (1)	*Nil*
Southeast Asia	19-23 (1)	07-09 (1) 09-11 (2) 11-12 (1) 21-23 (1) 23-01 (2) 01-03 (1)	03-05 (1) 05-06 (2) 06-07 (1)	04-06 (1)
Far East	14-16 (1) 20-23 (1)	07-10 (2) 10-13 (1) 21-23 (1) 23-00 (2) 00-02 (3) 02-04 (2) 04-07 (1)	02-03 (1) 03-04 (2) 04-05 (3) 05-06 (2) 06-07 (1)	03-06 (1)
South Pacific & New Zealand	13-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	02-07 (1) 07-10 (2) 10-16 (1) 16-18 (2) 18-19 (3) 19-22 (4) 00-02 (2)	23-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1)	00-02 (1) 02-06 (2) 06-07 (1) 02-05 (1)*

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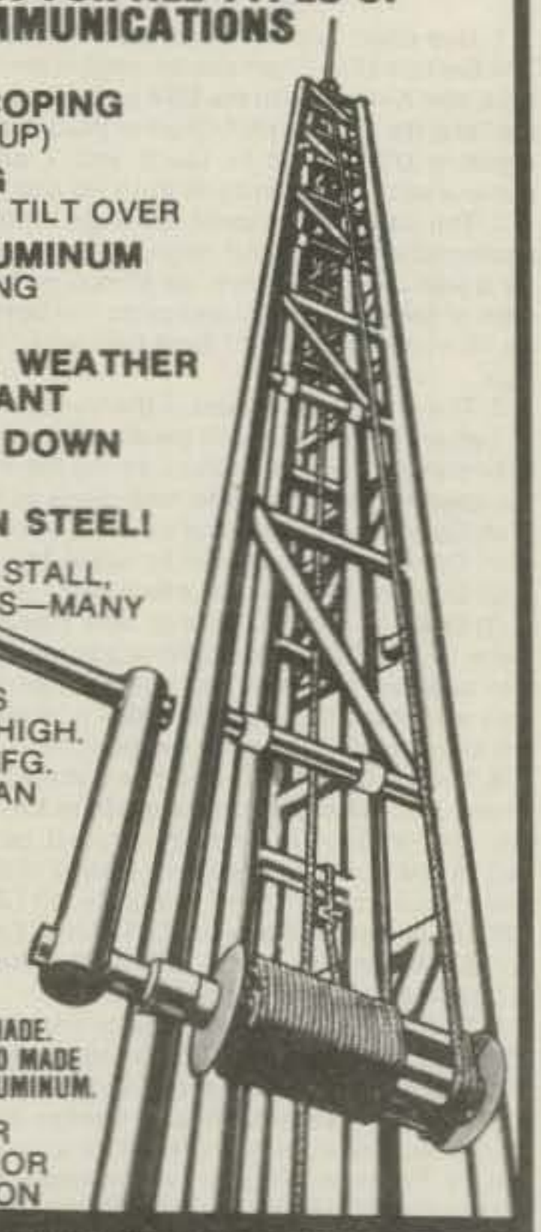

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CIRCLE 50 ON READER SERVICE CARD

Australasia	15-18 (1) 18-21 (2) 21-22 (1)	19-21 (1) 21-22 (2) 22-00 (3) 00-01 (2) 01-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (1)	00-01 (1) 01-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	02-05 (1) 05-06 (2) 06-07 (1) 04-06 (1)*
Caribbean, Central America & Northern Countries of South America	15-18 (1)** 10-13 (1) 13-15 (2) 15-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-10 (3) 10-15 (2) 15-18 (3) 18-21 (4) 21-22 (3) 22-23 (2) 23-02 (1)	19-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-06 (1)	20-21 (1) 21-03 (2) 03-05 (1) 23-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	12-16 (1)** 10-12 (1) 12-13 (2) 13-15 (3) 15-17 (2) 17-18 (1)	05-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-18 (3) 18-19 (4) 19-20 (3) 20-22 (2) 22-00 (1)	20-21 (1) 21-23 (2) 23-01 (1) 01-03 (2) 03-04 (1)	22-03 (1) 00-02 (1)*
McMurdo Sound, Antarctica	16-18 (1)	17-20 (1) 20-23 (2) 23-01 (1) 07-09 (1)	21-23 (1) 02-03 (1) 03-06 (2) 06-07 (1)	04-06 (1)

**Indicates best time for 160 meter opening.*
***Indicates best time for 10 meter opening.*

meters during the day and *160* meters at night. For openings between 250 and 750 miles, *40* meters should be best during the day and *80* meters at night. For openings beyond 750 miles, *20* meters should be optimum during the day and *40* meters at night. Frequent short-skip, sporadic-*E* type openings are also expected on *10* and *15* meters over distances between approximately 600 and 1300 miles.

VHF Ionospheric Openings

Expect a considerable increase in sporadic-*E* propagation during June and the summer months. This should result in fairly frequent *6* meter openings over a range of approximately 1000 to 1400 miles. During periods of geographically widespread ionization, two-hop *6* meter openings may occasionally be possible up to about 2300 miles. An occasional 2 meter short-skip opening, between approximately 1200 and 1400 miles, may also be possible during periods of intense sporadic-*E* ionization. Short-skip openings are most likely to occur between 10 a.m. and 2 p.m. and again between 6 and 10 p.m., local daylight time, although they can occur at other times as well.

Look for some meteor activity between June 7 and 9, which could increase the possibility for meteor scatter-type openings on the VHF bands.

Check the Last Minute Forecast at the beginning of this column for those days during June that are expected to be Below Normal or Disturbed on the HF bands. These are the days on which auroral and other types of ionospheric propagation may be possible on the VHF bands.

This month's *CQ* Propagation Charts contain DX predictions for the period June 15 through August 15, 1986. Short-Skip Charts for June, for openings between 50 and 2300 miles, and from Hawaii and Alaska, appeared in last month's column.

73, George, W3ASK

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RS-35A, RS-35M, VS-35M	25	35	5 × 11 × 11	27
RS-20A, RS-20M, RS-20S, VS-20M	16	20	5 × 9 × 10½	18
RS-12A, RS-12M, RS-12S	9	12	4½ × 8 × 9	13
RS-10A	7.5	11	4 × 7½ × 10¼	11
RS-7A, RS-7B	5	7	3¼ × 6½ × 9 4 × 7½ × 10¾	9
RS-4A	3	4	3¼ × 6½ × 9	5

*ICS - Intermittent Communications Service (50% Duty Cycle)

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CIRCLE 98 ON READER SERVICE CARD

Antennas & Accessories

a monthly feature by
KARL T. THURBER, JR., W8FX

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

More Mail

This time around it's another peek into W8FX's mailbag, an examination of some new antenna products, and a look at some useful hamshack software and reading matter. —*K2EEK*

Last month we focused on several of the more interesting and informative letters on antenna and software subjects which had been received in recent months. We highlighted some new antenna products and software, perused some new and interesting reading matter, and presented our Antenna Manufacturers Directory. This directory, incidentally, supplemented the dealers list which appeared previously in the Antennas & Accessories column. This time we would like to keep the same ball rolling with a look at more mail, more new antenna products and software, and more reading material. First let's unzip the mailbag.

From the Mailbag

As we indicated last time we got together, rarely does a day go by without a letter from a reader. From those received over the past several months I've selected four to excerpt here—two on antenna subjects and two on computer topics. First, a letter on an antenna about which little seems to be written these days.

The Extended Double Zepp. Bill Cunningham, W4SSV, an enthusiastic G5RV user, wrote to inquire if we could provide some information on the Extended Double Zepp (in some sources, it's called a "Double Extended Zepp"). Bill indicated that recently he had observed several doing a good job, but had found little material on them in his antenna references. He wanted to put up a dipole in a 200 foot "chimney to woods" span that he had available.

Actually, there is nothing terribly special about this antenna, which is shown in fig. 1. It may be thought of as a special case of the dipole, or as a two-element Franklin colinear array. To review, colinears make very suitable 75, 30, and 40 meter antennas. The colinear system is made up of two or more radiating sections from 0.5 to 0.65 wavelength, with the current in-phase in each section. As a rule of thumb, the gain of a colinear system using half-wave elements is about equal to the number of elements in the array.

However, the Extended Double Zepp exhibits a gain over a simple dipole of 3 dB, which is somewhat more than the usual two-element colinear gain of about 2 dB. The added gain is achieved by the expedient of making the two colinear elements longer than the usual one-half wavelength. This effectively increases the spacing between the two in-phase half-wave sections at the ends of the wires—and wider spacing in a simple two-element colinear design means higher gain. The optimum length for each element is 0.64 wavelength; if this length is made greater, the antenna tends to act as a longwire, with decreased gain. The resultant horizontal pattern concentrates radiation rather tightly broadside to the wire, though some minor lobes are present. The vertical radiation pattern is comparable to that of the dipole.

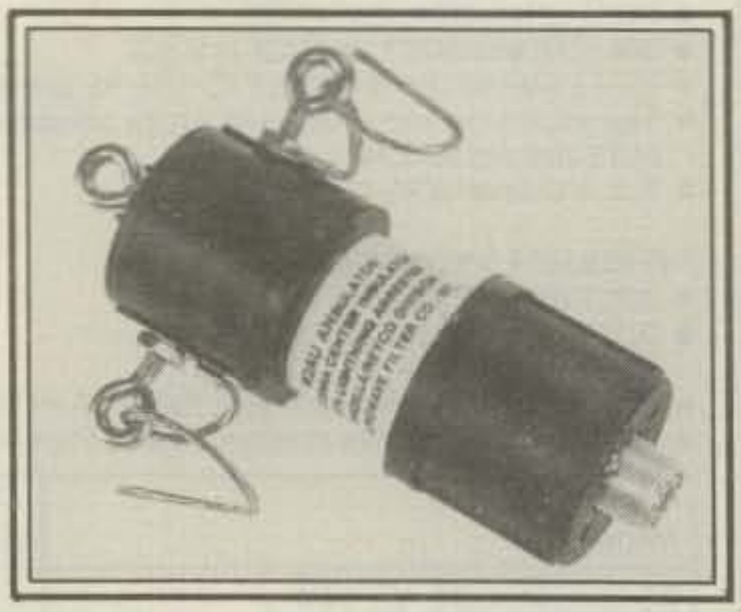
The high impedance at the antenna midpoint suggests the use of openwire transmission line. While the use of such low-loss line should give satisfactory results when the system is fed through an antenna tuner, the line may behave better if a quarterwave matching stub is used. One approach to keep the impedance low (around 150 ohms) is suggested by Bill Orr, W6SAI, in his *Radio Handbook*. He suggests using a shortened phasing stub to keep the whole array in resonance. In this arrangement, instead of having half-wavelength elements and quarter-wavelength stubs, the elements are 0.64 wavelength, while the stubs are shortened to but 0.11 wavelength.

Okay, are there any Extended Double Zepp enthusiasts out there? If so, drop us a line with your experiences with this antenna, especially in terms of feedline matching and transmitter loading.

More on the G5RV Antenna. C.E. Peacock, VE3ODF, sent along a copy of a July 1984 article by Louis Varney, G5RV from the British journal *Radio Communications*. In this article the author updated his experience and findings with respect to his famous antenna, which, incidentally, was designed in 1946 but first appeared in print in November 1966 in the *RSGB Bulletin*. Some of his more astute observations are as follows, all more or less confirming readers' experiences with the antenna as reported in this column:

1. The antenna can be fed by any convenient type of feeder, providing a suitable antenna tuner is used. However, the matching section should preferably be of openwire (or at least windowed dielectric) construction, for minimum loss.

2. The original system suggested using a balun to provide the balanced-to-unbalanced transformation at the base of the matching section. However, the use of the



Antennas such as the G5RV and the Extended Double Zepp, which are usually directly fed with parallel-wire transmission line, do not lend themselves to antenna center insulators such as this "Ansulator™." However, such weatherized antenna center insulators are ideal for coax feed. This type of insulator helps to avoid breakage and minimize foreign matter (rain, dust, etc.) at the feedpoint. (Photo courtesy Unadilla/Reyco/Inline)

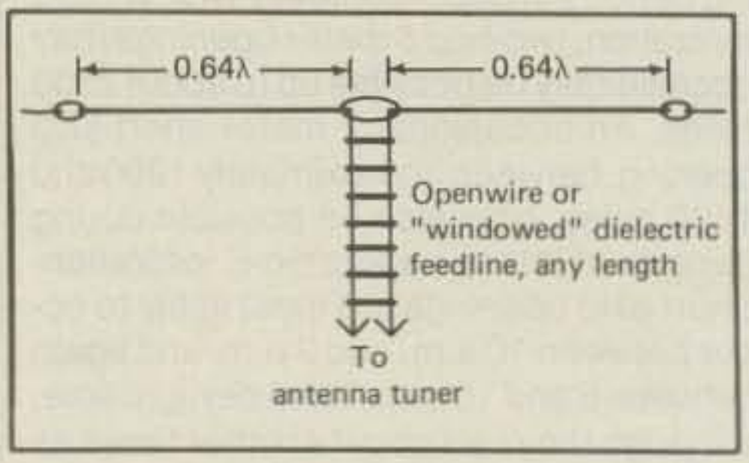


Fig. 1– The Extended Double Zepp is a "special case" of the two-element colinear, which normally has a gain of about 2 dB as compared to an ordinary half-wavelength dipole. By making the antenna a little longer, 0.64 wavelength on a leg, it exhibits a gain of about 3 dB on the band of primary interest. On this band, and at half this frequency, the antenna's maximum radiation is at right angles to the wire. However, on the higher frequency "harmonics" the pattern tends toward the X-shapes exhibited by one- and two-wavelength antennas. Construction details are the same as for other parallel-line-fed antennas, as shown above. Note that these antennas are rather long—about 86 feet, for example, for an Extended Double Zepp for 20 meters.

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balun with reactive loads has been found to be undesirable, as internal balun losses may become excessive and overheating may occur. By far, the most troublefree is achieved with openwire line. *(Ed. note: As pointed out in the column in recent months, non-toroidal baluns, such as the W2DU type sold by Unadilla/Reyco/Inline, hold promise in replacing the more common toroidal units operating under such conditions.)*

3. On each band, including the new WARC bands, the G5RV has a clear-cut theory of operation. To look at the WARC frequencies, for example, on 10 MHz the antenna acts as a two halfwave, in-phase colinear array; on 18 MHz it acts as two full-wave antennas fed in phase; and on 24 MHz it behaves as a ½-wavelength longwire.

Incidentally, the designer of the G5RV antenna, Louis Varney, was first licensed with the British callsign 2ARV in 1928, then as G5RV in 1929. He first experimented with what became known as the G5RV antenna in 1946, and is the author of many articles on TVI suppression techniques, transmitter design, and antenna systems. He has visited or lived in some 75 countries and has held licenses, or operated as a guest operator, in 55 of these.

We received several additional letters on the G5RV in recent months, including notes from Alden Gamage, WA9QMO, and Leo Widmyer, WA8ALH. Alden has been using a G5RV (center at 35 feet, ends at 20) using a 40 foot openwire feedline. He reports excellent results on all HF bands. Leo, on the other hand, erected a G5RV fed with 77 feet of 450 ohm openwire line, using an MFJ antenna tuner which has a built-in balun.

Notes from Wayne, N6NB. In last August's column we did a mini-review of Overbeck and Steffen's book, *Computer Programs for Amateur Radio*. To recall, their book is both a hamshack computer tutorial and a comprehensive collection of BASIC programs for hams that can be used on several different popular personal computers, including the TRS-80, Commodore 64, IBM-PC, and others operating under CP/M.

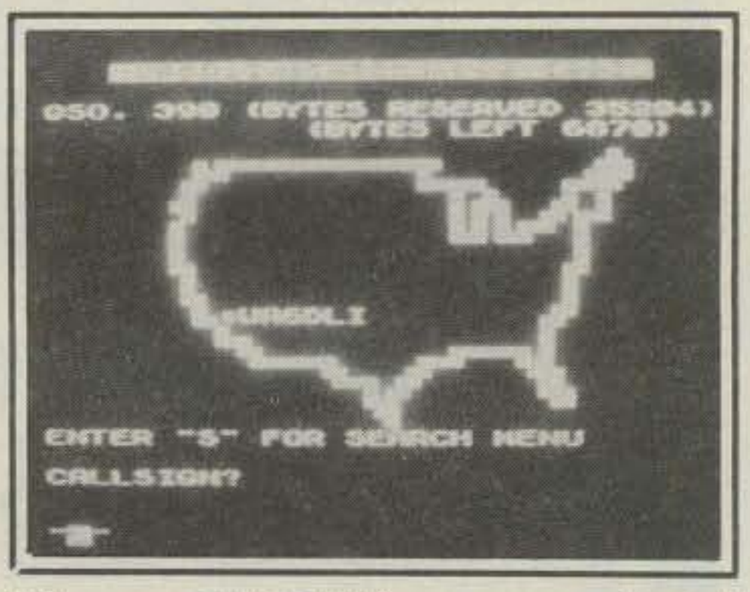
I had posed to Wayne a question as to availability of various disk formats, particularly CP/M (which may enjoy something of a renaissance now that the good-selling Commodore 128 supports CP/M). In response, Wayne advised that the CP/M formats which he and co-author Jim Steffen can readily support are the IBM 3740 (8 inch single density, the old industry standard which is compatible with the Xerox 820, Cromemco, and many other early micros); Apple CP/M (Microsoft format, requiring two disks); and Northstar CP/M (double density, 10 sectors). Microsoft BASIC (MBASIC.COM) is required to run all CP/M versions of the software.

Other non-CP/M formats which are available include the IBM-PC in DOS 1.1 format (readable under DOS 2.0); Apple DOS 3.3; TRS-80 Model I single density (requires two disks); and Commodore 64, in the 1541 disk format. The disks, by the way, are available from several amateur radio book dealers, or for $20 ($22 when two disks are required) from Jim Steffen, KC6A, 6831 Espanita, Long Beach, CA 90815.

Wayne indicated that neither of the authors owns a Kaypro or Osborne computer, and so could not supply the disks in the formats most suitable for the C-128 computer. The CP/M disks which they could supply would definitely not work with the CP/M adaptor which was sold for the Commodore 64, and which constitutes a completely nonstandard CP/M system.

The correspondence which I had with Wayne brought up the sweet-and-sour reputation which Commodore computers have. I have been a strong supporter of the Commodore Vic-20, and later the Commodore 64, though at the same time recognizing their limitations, particularly with respect to their screen size and disk-drive access. Nevertheless, these computers have become extremely popular in the hamshack, primarily on a capability-per-dollar basis—i.e., they're cheap and there are gobs of software for them.

I'll stick my neck out a little and predict that the Commodore 128, released last year, will slowly supplant the 64 in the hamshack. I own a 128 and have found it to be highly reliable, its disk drive (the C-1571) to be a good one, and the 80-column screen to be "like a big computer." The fact that the C-128 is really three computers in one—a C-64 for software compatibility, a C-128 for 40/80 column work with a fast disk drive, and a machine equipped with CP/M 3.0—means that the computer has a good deal going for it. Only time well tell the extent of its acceptance.



Title page of WA6DLI log program adapted from the 1982 QZX magazine published program for the ZX81/TS1000/1500. Interestingly, Bob reports that this program has all contacts he has logged since 1983. (Photo courtesy WA6DLI)

Incidentally, we wonder if there is anyone out there actively programming in the Commodore 128's CP/M mode? If so, we would very much like to learn of your experiences, particularly with respect to hamshack applications programs.

Timex-Sinclair Lives! A rather lengthy letter from Bob Howard, WA6DLI, reminded us that this line of computers is far from dead. Indeed, Timex is still in the home computer market, at least in Europe. When Timex threw in the towel in the U.S. in early 1984, their computer manufacturing facilities in Portugal continued their work, including research and the development of new products. Excerpting from Bob's definitive update on these computers:

"I thought it was about time I told you about the activity and support available for Timex-Sinclair. The main support since the demise of *Sync Magazine* is in the form of newsletters from the user groups and homebrew magazines. Instead of a de-

WA6DLI hamshack console with Drake TR7. Screen map at right shows the Spectrum/2068 AMSAT program by John, GM4IHJ, up and running. (Photo courtesy WA6DLI)

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mise, there are even new computers, and the old ones are getting better. There is a hard core of enthusiasts for the ZX81, TS1000, and 1500. The Timex Color Computer, Model 2068, is one of the most advanced 8-bit computers, and instead of dying is now being built in the Timex plant in Portugal, complete with disk drives. Of course, all of these computers are really Sinclairs adapted for the USA.

"With their English equivalents, there have been about 3.5 million of the ZX81/TS1000/1500, about 100,000 TS2068's, and 2 million of the Spectrums (now the Spectrum Plus) made. The QL, a 32-bit computer, is now available in the US from Sinclair or American Express. The big deal, of course, is that with a simple ROM chip adapter in the cartridge port or installed inside the computer, the 2068 can become a Spectrum and have over 5000 programs from England available for it—including some amateur radio programs."

Bob continues: "In the U.S. we have two on-the-air QZX amateur radio nets. The West Coast version is on 7235 kHz SSB on Saturday mornings at 10 a.m. Pacific time; the East Coast net is on 7245 kHz Sundays at 11 a.m. Eastern time. These nets support the Timex-Sinclair ham newsletter, *QZX*, published by K5XY at $15 per year [contact Alex Burr, 2025 O'Donnell Dr., Las Cruces, NM 88001]."

Bob provided us a great deal more information than we could possibly have room for in the column, but he did point out some excellent resources which we could share here. Several good magazines, he advises, are *TS Horizons* (2002 Summit St., Portsmouth, OH 45662), *SUM,* a users magazine (3224 NW 30th Ave., Gainesville, FL 32605), and the English *ZX Computing,* a bi-monthly from INFONET (10-13 Times House, 179 Marlowes, Hemel Hempstead, Herts. HP11BB, England).

He also advises us that the Portugal-made TS-2068, disk drives, and English Spectrum Plus are available in the U.S. from The English Micro Connection, 15 Kilburn Court, Newport, RI 02840. Bob also indicated that some excellent Timex-Sinclair amateur software and hardware/software packages are available from NU4V, WD4HDT, N9BBN, and SM3HBQ.

If you're a Timex-Sinclair type and want to trade notes with Bob, contact Bob Howard, WA6DLI, 750 N. Yaleton Ave., West Covina, CA 91790.

New Products

TENNA HITCH. G.B. "Jim" Lane II, N5DC, has come up with an interesting product for the mobiler that is designed to cope with the problems associated with HF mobile antenna installation on late model cars which have "no bumpers." Since it is practically impossible to mount the antenna using the old chain-type of bumper mount, the option exercised is usually to go with some type of body ball or trunk-lip mount.

The D C Sales TENNA HITCH represents one solution to the problem of installing HF antennas on late-model automobiles with no bumpers. The device still allows you to pull a trailer with no changes. (Photo courtesy N5DC)

Both of these types of mounts have their disadvantages, not the least of which is either having to punch holes in the body of your $18,000 Snazzmobile, or at a minimum, marring the finish with a clip-on. These vehicles pose real mounting problems, particularly if you aren't about to punch holes in the body and/or want to pull your trailer and operate HF at the same time.

Jim's interesting device is a special bracket made to fit on your existing trailer hitch, and it fastens under the ball. The bracket, designed to fit any class one or two hitch, is made from high-quality cold drawn steel and Lexan, and is complete with all of the hardware (nuts, bolts, washers, insulators, etc.) needed to adapt any mobile HF or VHF antenna that uses the standard ⅜" × 24 tpi mount. As an added plus, you can still pull a trailer with the bracket installed and an antenna mounted on the bracket.

The TENNA HITCH is available from several dealers, or it may be obtained directly from Jim for $29.95 plus $5 shipping. Contact D C Sales, 1602 Chestnut Ridge Rd., Kingwood, TX 77339. Jim advises us that by spring he should also have a line of HF mobile antennas ready to go.

N.C.G. Antennas. The N.C.G. Company is probably best known as an importer of HF and VHF transceivers and accessories. However, a recent catalog shows a considerable variety of HF, VHF, and UHF antennas added to the product line. A fairly unusual HF antenna is the HF-3WK, a triband trap vertical for the three WARC bands, 10, 18, and 24 MHz. This is a self-standing antenna designed to handle 1 kw PEP and exhibit a VSWR at resonance of less than 1.5:1 on each of the three bands. A four-band (40, 15, 10, and 6 meter) vertical is also offered, as are several 2 and 6 meter, 70 cm, and 1.2 GHz mobile and base/repeater antennas. For more details, write the N.C.G. Co., 1275 North Grove St., Anaheim, CA 92806.

Pasternack Enterprises. If you're in need of an unusual coaxial connector or cable assembly, you probably need look no further. A recent 24-page catalog from Pasternack was chock full of virtually every conceivable coaxial adapter, connector, attenuator, termination, and cable assembly, not to mention twinax connectors and adapters. The firm does, however, have a $100 minimum order and $10 minimum line item ordering requirement, so it probably would be necessary to combine orders. The illustrated catalog makes an excellent reference source; contact the Coaxial Products Division, Pasternack Enterprises, P.O. Box 16759, Irvine, CA 92713.

Good Reading

Those Far-Away Places! What could be more interesting to an avid DXer and potential DXpedition participant than a book with complete details on the major island locations around the world? There is such a book, by Jon Fisher, and it's called *Uninhabited and Deserted Islands*. In this book the author describes the key details on more than 150 islands which fit the criteria suggested by the book's title. While a few of these have, in the past, been inhabited and thus have existing structures, all are reportedly deserted at this time. And, though some of the islands have been used by celebrated amateur DXpeditions, others await being placed on the radio map for the first time as new countries. Some of the more exotic islands described include Ata, St. Paul, Blenheim Reef, Peros Banhos, Masse, Deception, and Palmyra, to name just a few.

The book contains more than 40 maps. Detailed descriptions of the history, status, and physical conditions of the islands are provided, and geographic coordinates show their exact locations. An island index and bibliography round out this unusual book. Fisher's 112-page book is sold for $8.95 plus $1 postage by CRB Research, P.O. Box 56, Commack, NY 11725.

The Complete DX'er. Speaking of DXing, noted DXer Bob Locher, W9KNI, has authored a book that may become "required reading" for the confirmed DX hound. Written in a conversational style, Bob's book is designed to help the reader learn how to attain DX success, with emphasis on making the DX Honor Roll. Oriented to the CW operator, *The Complete DX'er* consists of 24 chapters and an appendix. It is devoted primarily to operating techniques such as listening skills, using a second language, getting through pileups, calling procedures, and the like. Also covered are equipment and accessory considerations, choice of operating location, antennas, and sources of DX information. There is even a chapter on DX chasing philosophy; it's chapter 21, "Winning, Losing, and Playing the Game."

Maybe we all can't make the Honor Roll, but a book like Bob's can certainly help. The price is $10.95 plus $2 postage and handling, and it's available from *CQ*'s Book Shop, or the Idiom Press, P.O. Box 583, Deerfield, IL 60015.

Computer Books of Note. Both Prentice-Hall and Howard W. Sams Co. have extensive computer book lines. Prentice-Hall has, at last report, a six-page flyer which contains synopses of some 40 computer books for the Commodore 64 alone (presumably other catalogs cater to other systems). Some of the more interesting titles I noted were books such as *Easy Interfacing Projects for the Commodore 64, Commodore 64 BASIC Programming with Technical Applications,* and *The Commodore 64 Guide to Data Files and Advanced BASIC.*

Sam's four-page catalog covers topical areas such as languages, operating systems (including CP/M, UNIX, and MS DOS), business software and applications, data communications, beginning computing, and leading edge technologies.

For a flyer contact Prentice-Hall, Inc., Book Distribution Center, Route 59 at Brook Hill Drive, West Nyack, NY 10995; or Howard W. Sams & Co., Inc., 4300 West 62nd St., Indianapolis, IN 46206.

Software of Note

Rockford MS DOS Software. Rockford Electronic Systems, 7474 Hessler NE, Rockford, MI 49341, offers a growing line of amateur radio software for IBM PC's and compatibles operating under MS DOS or PC DOS. Rockford has put together a five-disk set of ham utilities, priced at $5.50 each, or $22.50 for the set.

The five disks offered include: (1) Ham utilities in generic MS DOS BASIC; (2) More ham utilities and information; (3) Ham communications programs and information; (4) Contest logging utilities; and (5) a SWEEPSTAKES logging package. In addition to these five disks, a separate DX-DATA program disk is priced at $8.50. This program finds beam headings for most areas of the world, from city/country, lat/long, or prefix inputs.

QSTMUF. A simplified maximum usable frequency (MUF) prediction program based on the December 1982 *QST* article, "Minimuf 3.5," by Robert B. Rose, is available from an agency of the National Oceanographic and Atmospheric Administration (NOAA). *QSTMUF* is available from NOAA on magnetic tape or disk, or in document form. Originally written in BASIC for the TRS-80 computer, modified versions have been produced for the IBM-PC, Vector, and Apple Compatible computers.

To recap the significance of the MUF calculation, the HF skywave channel for radio communications is usually described as being bounded by the lowest usable frequency (LUF) and the maximum usable frequency (MUF). The closer to the MUF one operates, the more efficient the communications channel becomes. Because of MUF's variance day to day, controlled by changing levels of solar activity and illumination along the signal path, and because it is sometimes very different than long-term predictions would show, a simplified MUF-prediction algorithm is a very useful DX tool.

Given the date, transmitter and receiver location, and the solar flux or sunspot number, an hourly output can be determined. The required flux values are easily obtained from WWV transmissions at 18 minutes after each hour. In the *QSTMUF* program a conversion option from the solar flux index to sunspot number is included. Another program option allows the generated hourly MUF values to be written to a data file.

Microcomputer-specific program versions are available for these four computers (TRS-80, Apple, IBM-PC, and Vector) for $30.00, which includes documentation. According to the program announcement which was forwarded to us by reader N8FNR, inquiries should be addressed to Mr. Ray Conkright at 303-497-6468. Or, write to the National Geophysical Data Center, Solar-Terrestrial Physics Division (E/GC2), 325 Broadway, Boulder, CO 80303.

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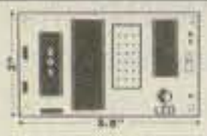

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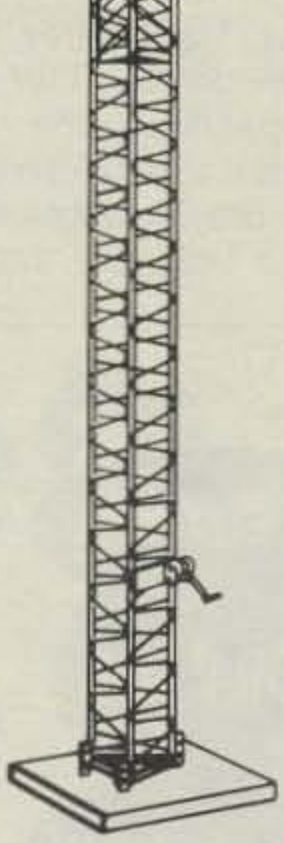

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of public-domain software at minimal cost. The programs offered are presented in three libraries, for the Commodore 64, IBM-PC, and CP/M Computers, according to PDUG's William Rogers.

For those who may not be familiar with the public-domain concept, such software constitutes user-donated programs provided by their authors to the public for free. There are thousands of such programs available for a wide range of computers, with something for everyone, whatever your interests may be. According to William Rogers, he decided to form this group three years ago after having spent a good deal of money on commercial software, only to find out later that similar, or in some cases even better, software was available in the public domain. Membership in PDUG is open, though there is a $10 annual membership fee, which entitles members to rent the PDUG disks for $2 each, to cover the cost of postage and handling.

In perusing a recent PDUG catalog I did not see any specifically amateur-radio-oriented programs, though there were numerous utility and special-purpose programs available that most serious computer users could easily make use of. There are thousands of MS DOS programs and hundreds of CP/M programs available, the latter in over 70 Z-80 CP/M disk and computer formats. Many programs are available for the Commodore 64 as well.

Of special note, PDUG has tested the disks in its CP/M library for C-128 compatibility and has set up a separate C-128 CP/M section to make available the programs that will work on that computer. At this writing, at least 11 disks of C-128 compatible CP/M software are offered; they are furnished in the Osborne SSDD format, likely the best format for the C-128 operating in CP/M mode. For more details, contact the Public Domain Users Group, P.O. Box 1442, Orange Park, FL 32067.

Three from Microlog. Microlog Corporation has announced three amateur radio read-only-memory (ROM) cartridges for use with the Commodore 64. These are the SWL, CW-1 Transmitter Module, and the Morse Coach. The first of these, the SWL cartridge, is designed for the shortwave listener who does not need a transmitting capability. Essentially, it is the receive portion of Microlog's popular AIR-1 program in permanent ROM, with both demodulators on-board for RTTY and CW reception. It's a complete, ready-to-use package, and it includes built-in speaker and hand-key jacks. The cartridge is priced at $64.00 including a connecting cable and demo cassette.

The CW-1 Transmitter Module, conversely, provides the CW transmit and memory capability of the AIR-1 in ROM. The program and built-in transmitter keying circuitry provide excellent Morse generation up to 149 wpm, and it includes a 28,000 character text buffer with split-screen display. Eight programmable chain memories of 512 characters each and two ID memories are available. A printer is supported by the cartridge, which is priced at $49.95.

The third ROM cartridge offered is the Morse Coach, billed as a complete Morse code tutor in a plug-in device. The "alphabet" part of the program introduces new characters and plots progress on a bar chart. The speed/test section correlates the input, analyzes mistakes, and provides a printout of the analysis/test results. No knowledge of Morse is required to start using the device, which progresses the student through the alphanumeric symbols and on to any desired speed level. It, too, is priced at $49.95.

For more details on the three ROM cartridges, contact Microlog Corporation, 18713 Mooney Drive, Gaithersburg, MD 20879.

Wrapping It Up

That's all for this month. This time we have unzipped the mailbag for a second look in as many months, highlighted some new antenna products, taken note of some interesting hamshack reading materials, and described some new hamshack software. Next month more timely topics of interest. See you then.

73, Karl, W8FX

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Ticket Talk

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INFO ON AMATEUR RADIO LICENSING

Processing of Upgraded Amateur Radio License Applications

"*I haven't received my upgraded license yet. What do I do?*" This is one of the most common inquiries that a VEC gets. Let's discuss what is involved in detail this month. First of all three different groups are involved in seeing that you get your new license. They are the VE, VEC, FCC, and *you*!

The Volunteer Examiner

After the test is over, the VE team must put all of the session papers in order. It is not merely a case of putting everything in an envelope and forwarding to the VEC. There is a certain format that must be maintained. The required documents consist of FCC Form 610 applications, applicant license copies, code credit certificates, test papers, and various session report forms. Each must be carefully checked by the VE for proper completion before mailing. The rules call for the VE team to mail the paperwork to the VEC within ten calendar days of the test session.

The Volunteer Examiner Coordinator

The VEC acts as the liaison between its many VE teams and the FCC. As a VEC, we probably get in ten or more test session packages a week, and this is increasing. The VEC must screen each session for proper handling. This normally consists of examining the test papers, going over entries on the FCC Form 610 application, checking that the proper attachments (such as copies of code credit certificates, current licenses) are appended, and reviewing for correctness the test session summaries required by the FCC.

A VEC can handle a VE session package fairly fast if the VE team has followed the VEC's instructions and everything is in proper order. However, sometimes a VEC encounters situations that vary from the norm. These situations might include applicants with expired licenses who upgrade within the grace period, applicants who further upgrade without their most recent upgrade license in their posession, errors on the application, missing signatures, and so forth.

The VEC must also forward session packages to the FCC within ten calendar days of receipt from the VE team. This does not mean, however, that every application is sent. If an application is defective or must be held for some other reason, then this is pulled out for special handling and the rest of the applications are forwarded to the FCC for license issuance.

A VEC either must write the testing team (if a VE discrepancy) or the applicant if the error is on the application. The "ten day forwarding rule" does not apply to defective applications (or to complete test sessions) if the applications or the entire test session papers can't be forwarded to the FCC's Gettysburg licensing facility because of discrepancies. Applications received at the VEC without the required test papers must be held pending their receipt. While an exception, it does happen.

The most recent amateur operator license must be attached to the back of an application. If you have graded up twice before your previous upgrade license is received, then the VEC must hold this application until you forward it. We currently are holding several dozen applications for various reasons. VEC's are required to notify the applicant when delays are incurred.

The point is that while most applications are forwarded to the FCC for license issuance within a couple of weeks—give or take a week—not all are. It can take *several months* for the license paperwork to catch up with an applicant's test taking. An applicant who puts down the current year on an application instead of his year of birth will find that he has incurred a month's delay in getting a license, since the VEC must starting writing letters to get a correction. Not all are written the same day as the error is detected. The session packet gets forwarded to the Commission without your application.

Being a VEC would be a cinch if it were not for the exceptions to the norm. We spend a lot of time and effort (and money) keeping our volunteer examiners clued in on the rules and how to handle exceptions! They usually do a good job.

We find that some potential VE's and amateur radio clubs are hesitant to conduct tests because they do not know what is involved. We have a VE Manual ($2.00 plus $1.00 postage) that we will forward to *anyone* if you want to review it before committing to testing. The procedure is really very simple. Completed sample copies of applications and all test session report forms are included. (VE's that advise us of a testing date are automatically sent the manual without cost.) While we only accredit Extra class amateurs to conduct amateur radio operator tests above the Novice level, some VEC programs allow Advanced class VE's to administer the Technician class.

The FCC

The FCC's licensing facility in Gettysburg, Pennsylvania preliminarily inspects each VEC's test session applications and covering reports. A more thorough review of every application is completed later. Most are forwarded to "keystroking"—entering the data into a computer terminal. If errors are detected on the session report or an individual application, then the VEC is notified and, in some cases, the application goes back for correction.

The FCC keeps strict track of all discrepancies and issues monthly percentage figures on late submissions by VEC's, and errors on applications and Examination Test Reports. Every VEC tries to keep these percentages low! Since every application is checked four times (by three volunteer examiners and the VEC), errors should be nonexistent. Still they creep through once in a while.

Ordinarily it takes about a month for an amateur radio operator upgrade license to be issued *once the application is received in good order*. It takes a month because the license data is output on a magnetic tape and driven by courier to Washington, D.C. for comparison with the Commission's license data base.

If everything checks out, then your ticket is output about a week later when the tape gets back. This procedure exists to prevent applicants under various administrative sanctions from being routinely licensed under the VE system. Novice licenses and regular renewals are handled faster, but even they are compared with the Washington data. Assuming no backlog, license receipt by an applicant *usually* takes place about six or seven weeks after the upgrade tests are administered.

Instant Upgrade Certificates

A quick word about temporary operating authority is in order here. The *Certificate of Successful Completion of Examination* serves two purposes: (1) It is used as evidence of passing a required telegraphy element; and (2) it is proof that an applicant has passed additional elements necessary to upgrade. Although the certificate allows temporary upgrade operating privileges, *it is not a license or permit*. Only the FCC has the authority to issue a license. This is done only after the applicant has successfully passed the FCC

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Say You Saw It In CQ

data-base screening process. Since the Certificate of Successful Completion is not a license, the temporary privileges it offers can easily be rescinded without involved FCC administrative handling.

At present only Morse code certificate credit is given, but the FCC has recently proposed in Docket 86-63 to allow credit for written examinations as well. This will enable VE's to administer written examinations before the code test. Actually you would not have to even take a code test to get written examination credit good for one year! You could take the code test(s) later during the coming year as your skill improves!

The FCC is also considering a new system of FCC Form 610 application submission. Rather than have the VEC hold the application, an applicant who has not yet received his most recent license (and has upgraded further) will be allowed to retain the application through a VEC later when the license finally arrives.

Still No License, What To Do?

Unless you have heard to the contrary from the VE team or the VEC, you can assume that your application is indeed being processed. Under no circumstances should you contact your local FCC field office about the status of your application. The Field offices are now *completely* out of the testing business. All they can do is refer you to the VE team that administered the test, the VEC, or the Consumer Assistance Branch at Gettysburg.

You should also be aware that Gettysburg does not maintain any record of received applications from VEC's. In fact, they won't have a record of your application until it is time to issue the license. We get calls all the time from disgruntled amateurs who tell us that the FCC has told them that they have "no record" of their application for upgrade. This is true. They do have *no record* of it, but our experience is that they have it *somewhere* in their processing system.

As a VEC, we get far too many routine calls from applicants who tell us that they took their upgrade test "last month" and have not received their new license. Dealing with these calls keeps us from faster processing of the ones we have! We imagine it is the same for all VEC's. In fewer than one case in a hundred is there ever a problem. Be patient!

Applicants should contact their local VE team to ensure that their application was indeed forwarded to the VEC. Different VEC's have different procedures, but we prefer to deal with the VE rather than the applicant. We don't recommend that a *VE* contact the VEC until at least 60, and preferably 90, days have passed since test administration. By this time the VE team will know if other applicants have received their new licenses—and when.

Applicants can also contact the FCC *Consumer Assistance Branch* in Gettysburg, PA (Telephone: [717] 337-1212) after 60 days to determine if their license has been issued. Remember, they can only tell you if it has been issued—not whether they actually have the application without a desk-by-desk search which they are reluctant to do due to the time/cost involved.

If 90 days have passed since you upgraded *and you had your current license in your possession for appending to the application when you took the test*, then you should contact the VEC. In our case we have had only one lost application in the over 6,000 that we have processed. The only other cases have involved applicants who have moved and not arranged for proper forwarding of their mail. You have to do your part, too.

From The Mailbag

Some say, "The customer is always right." We say, "The customer is always writing." We try to answer some of the general-interest questions here monthly.

Who can be a volunteer examiner? How long is the term? You must be 18 years old and not related to the applicant. The FCC rules do not specify exactly who is to be considered "related to the applicant." Most VEC's take it to mean an individual's immediate family by blood or marriage. When in doubt, use other volunteer ex-

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aminers. The rules also specify that VE's cannot be in the license preparation material or amateur radio equipment business. VE's may be reimbursed for expenses but not be compensated for their services. You are precluded from being a VE if you have had your amateur operator or station license suspended or revoked. (§Part 97.31)

Different VECs have different accreditation guidelines. Some require that a VE be active to retain VE status. Our accreditation remains in effect indefinitely without renewal. A VEC is not required to accredit anyone.

My license has expired. Will I get my callsign back? It depends on when your license expired. Up until October 6, 1983, the grace period for amateur radio station callsigns was one year—five years for the operator license. When the FCC went to a ten-year license, they also adopted a two-year grace period for both the station and operator license. In other words, if you reapplied for a license within two years you did not have to be retested and received the same callsign as you previously had. After two years you would be assigned a new callsign and must be retested.

Present FCC policy is, however, that since a five-year grace period was in effect for the old five-year term license, they will retain it for those with five-year term licenses. When ten-year licenses expire, the two-year grace period on both will apply. Admittedly this is sort of confusing. In a sentence, five-year grace period on the operator license, two years on the callsign. The two-year grace period on operator licenses won't go into effect until 1994, since the FCC did not start issuing ten-year terms until 1984. A person with an expired license may not operate his amateur radio until the new reissued license has been received.

I teach amateur radio classes. Can I be a volunteer examiner? As a general rule, yes. You should not be a VE if you make a profit from the instruction, since that could be construed as being in the amateur radio business. There is no problem being a VE, a ham class instructor, and having your students pay your cost for license preparation materials.

Do all three VE's have to be Extra class amateurs? Different VEC's have different accreditation rules. We only accredit Extra class since only they can administer all of the tests. Advanced class VE's are only permitted by the FCC to administer Element 1A (5 wpm code), Element 2 (Novice written exam), and Element 3 (the Technician/General written examination). All three volunteer examiners must be of Extra class level to administer Element 1B (13 wpm) or IC (20 wpm code) or the Advanced (Element 4A) or Extra class (Element 4B) written tests. Only one (General class or higher level) examiner is needed for the Novice test elements.

Where do I get license preparation material? I would ask the VE administering or the VEC coordinating your tests. Although every VE/VEC has the same test questions, they don't all have the same answers! Adding to the confusion, no volunteer examiner is *required* to accept the answers that any VEC provides! We don't know of any that don't, however. It is far more expedient for an examiner to use them. The code test and all written text answers are really a VE function! Nowhere in the rules does it specify that the VEC provide the test answers.

Most amateur radio dealers have manuals that support the ARRL standard. But be careful that you get the right examination version. Every test question pool is revised annually on a staggered schedule and implemented during the subsequent six-month period that follows. A good way to check on the reliability of license preparation material is to inquire when it is valid. Be suspicious of any outlet that does not know.

Is it true that the new VE system will eventually be handled like the Novice program? It is our guess that it won't be long before volunteer examiners are not only responsible for all Morse code testing and written test answers, but for test design as well. By test design we mean selecting the proper number of questions from each subtopic according to instructions given by the VEC. §Part 97.27[d] indicates that beginning January 1, 1987 that VE may also design tests. The FCC has proposed to move up this date, and something may already be issued by the time you read this. When this happens, both the VE and the VEC can assemble and print examinations.

Volunteer examiners will be able to totally make up their own tests in much the same fashion as they do for the Novice examination now. Speculation is that an accredited VE team would be able to hold a test session whenever they cared to, and without advance authorization from or notification to the VEC.

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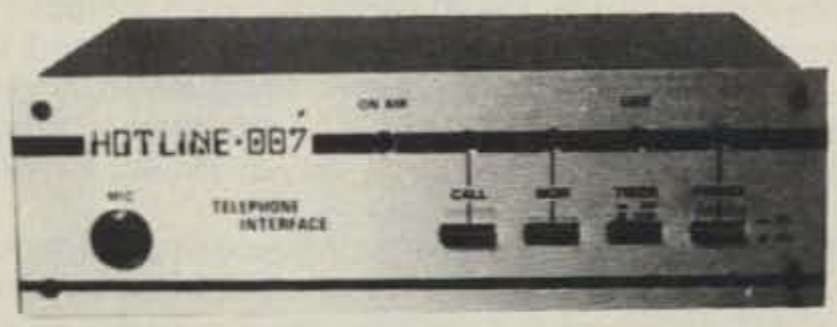

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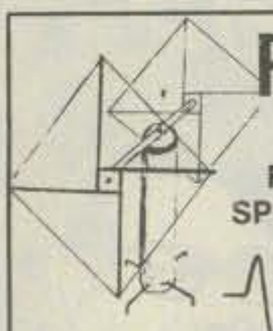

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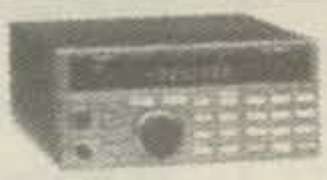

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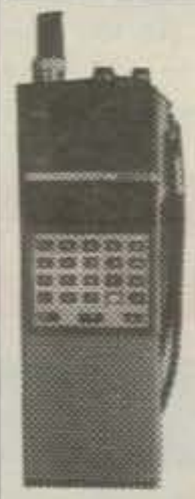

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